BULGARIAN JOURNAL OF SCIENCE AND EDUCATION POLICY (BJSEP)

Volume 3, Number 2, 2009
St. Kliment Ohridski University of Sofia

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Издаването на настоящия брой на списанието е с финансовата подкрепа на Фонд „Научни изследвания” при Министерството на образованието и науката

ISSN 1313-1958 (print)
ISSN 1313-9118 (online)
Printed in Bulgaria

BULGARIAN JOURNAL OF SCIENCE AND EDUCATION POLICY (BJSEP)

Contents

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ELEMENTARY PRE-SERVICE TEACHERS' OPINIONS ON TEACHING SCIENCE

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Abstract. This study investigates how pre-service teachers would like to teach science. For this purpose, they are asked about their beliefs on how they can teach science better; which methods they would like to employ; what they think about labs, making experiments and the features of experiments; their suggestions on recalling what is being learned. This subject is considered as important and investigated as the obtained results will give clues to the educators working in this field by reflecting both the quality and effectiveness of the program and training the students receive in order to become teachers and the quality of the opinions and suggestions of the pre-service teacher.

Keywords: pre-service teacher, science teaching, teacher education, teacher opinions

1. Introduction

Teacher training is one of the subjects considered important and current worldwide and various countries perform effective reforms concerning this issue. In the core of these reforms factors such as the need for individuals who

think, question and solve problems in accordance with the world concept developing and changing towards the importance of knowledge and the use of information are of great importance.

One of the reasons of the reforms carried out in teacher training is the fact that there are many important difficulties in teacher training programs such as the gap between theory and in-class applications and rejecting teaching strategies towards new education perception (De Jong & Brinkman, 1999)

Doyle (1997) indicated that the studies on teaching and teacher training moved from being teacher behavior oriented towards teachers' thoughts processes oriented.

Science education is an important part of general education and therefore the studies for activating science education are still an important issue (Hurd, 2002). Activating science education depends on giving a sound education by training capable and equipped teachers.

The first step of teaching better science is to train better science teachers. Howes (2002) examines what the question "how the pre-service teacher should be trained in order to teach science to everyone?" means. In his study, Howes approaches this question from the point of the difficulties the pre-service teacher encounter and determines these difficulties as the tendency towards inquiry approach, attention to children and awareness of school/society relationship.

Again Howes sees one of the typical shortcomings of primary school teachers as not knowing how to teach science and he suggests developing effective and inclusive science instruction. Mellado (1998) investigated the relation between teaching/learning science concepts and practice when teaching science and the results he obtained allow establishing a general correspondence between the two. He explains the reason of the situations as the fact that the academic knowledge (static knowledge) they receive during teacher training process is not sufficient to know how to teach science and it is necessary to

equipped them with the professional component (personal teaching experience and reflection, self-knowledge) named as dynamic knowledge.

Self-efficacy in teaching science is considered as an important quality that pre-service teacher need to have and many problems in teaching science can be solved by investigating the relationship between self efficacy and science teaching behaviors.

Cantrell et al. (2003) examined the factors effecting the efficacy of the pre-service teacher in teaching science and stated that the efficacy would increase if teacher training classes are focused on Bandura's (1977) four strategy (providing opportunities for mastery experiences, physiological and emotional arousal, vicarious experiences and social persuasion).

The quality of the science methodology classes also has an important part in teaching better science. Morrell & Carroll (2003) concluded that methodology classes positively affect the self efficacy of the pre-service teacher and stated that this result is quite encouraging due to the fact that classroom experience is considered as more important compared to previous studies and that methodology classes do not bring an additional value.

Doyle (1997) investigated the effects of the beliefs of pre-service teacher about the teaching program and found out that the act of learning and teaching had turned from a passive form in which teacher transmitted the knowledge into an active process in which teacher is the guide and that this result is related with the pre-service teacher' gaining experience in teaching situations. According to Skamp (1997), pre-service teacher need to focus on a good primary school science teacher concept that develops during teacher training process. In fact, as they are the teachers of the future, knowing what they think about learning and teaching situations might be an important factor in the development of teacher training programs (Aguirre & Heggerty, 1995). According to Brownlee et al. (2003), investigating the knowledge of the pre-service teacher about teaching provides assistance for effective learning in teacher training programs. According to Plourde (2002), finding answer to the ques-

tion ‘why the teachers cannot teach effective science’ will solve the problems related with this issue; because this is one of the major problems in science education.

In the last 20 years, the educators and programmers draw attention to the fact that how the pre-service teacher learn teaching and the conditions of better teaching (Minor et al., 2002). Educators need to know how teachers learn, what kind of knowledge they need to have in order to become effective teachers and the level of this information and they agree that knowledge and thoughts of the teacher are a critical factor in understanding how the teacher learns teaching and learning (Lowery, 2002). Also (De Jong & Brinkman 1999), teacher training and methods of lesson planning in different countries might interest the researchers from the fields other than science and mathematics. However, according to Tosun (2000) the beliefs of the pre-service teacher about the education systems are related with the teacher education programs as well as their attitudes.

This study investigates how primary school pre-service teacher would like to teach science. For this purpose, they are asked about their beliefs on how they can teach science better; which methods they would like to employ; what they think about laboratory, making experiments and the features of experiments; their suggestions on recalling what is being learned. This subject is considered as important and investigated as the obtained results will give clues to the educators working in this field by reflecting both the quality and effectiveness of the program and training the students receive in order to become teachers and the quality of the opinions and suggestions of the pre-service teacher.

1.1. Changes in teacher training programs in Turkey

In Turkey, within the frame of a three-year National education development project implemented by YOK (Higher Education Council) with

the credit taken from World Bank, education faculties are reconstructed by performing a series of reforms on teacher training between the years 1994-1997. The project was put into practice in 1998-1999 academic year on (Tekkaya et al., 2004; Çakıroğlu & Çakıroğlu, 2003). The aim of the project is to improve the quality of teacher training for primary and secondary schools.

Starting in 1998, all faculties of education in Turkey follow a standardized curriculum[1)] prescribed by the Higher Education Council (YOK). Preparation for the teaching profession requires the acquisition of knowledge and skills in the three domains which include general culture, special subject training, and pedagogy. With regard to the classroom teaching program, for example, the pedagogical domain consists of 30 credit hours (including the teaching practicum) and method courses (such as Turkish teaching, math teaching, science teaching, social studies teaching, or art teaching) consist of 109 credits, Also 13 credit hours are related to the general culture domain (Saban, 2003). One of the important aspects of the teacher training reform was the emphasis placed on field experiences such as classroom observation and teaching practice. With these classes, the learners had the chance to demonstrate their knowledge and experiences in schools and developed themselves.

As a result of the change in teacher training, important changes were made in the year 2000 in primary school science programs for 6-14 age group and these changes were put into practice in 2001-2002 academic year. Generally, when compared with the previous program, the units were narrowed down in the scope, updated and organized according to reaching content by way of scientific processes in this program. Also, the program is learner centered and developing scientific attitudes is given importance as well.

1.2. Changes in elementary school science programs in Turkey

In 2004 science classes programs were reorganized and another series of changes were made. The new programs were development. First of all, the name of the lesson is changed into Science and Technology. Major Features of the Program are: 1-Little amount of knowledge is concise (Instead of teaching great amount of knowledge to the students, it is aimed to provide meaningful learning by giving only fundamental concepts. Subjects related with technology and its applications were given emphasized); 2-Science and technology literacy (In their acquisition of knowledge related with every subject, acquisition of many skills related with science and technology literacy is given importance by making appropriate references); 3- Constructive teaching approach (Constructive approach is considered not only in its fundamental philosophy, but also in the learning and teaching activities in the teaching programs); 4- Learner centered teaching (As according to the constructive approach all of the learning-teaching activities should consider that the learner constructs knowledge in his mind, teaching is naturally learner centered); 5- Alternative evaluation and assessment approaches Process evaluation **(**As the program is based on constructive approach, assessment is a part of learning and alternative assessment approaches such as portfolio and process evaluation are emphasized); 6- Spiral principle (According to the spiral principle, major concepts and subjects are explained in the daily life experiences of the learner at every class level and the depth and scope of the subjects are increased as the class level increases); 7- Relating with other fields actively (In the teaching programs, clear references are made to the other subject fields such as mathematics and social sciences which are related with almost every acquisition) and 8- Considering the individual differences of the learners (As the fact that learning does not take place by transmitting knowledge packs into the minds of the learners but by constructing the new knowledge in the minds of the learners by using the advance information is

taken into consideration, individual differences are actively emphasized in all the learning and teaching activities naturally).[2)]

A fundamental shift towards student-centered/constructivist teaching and learning in classrooms is needed in order to fulfill the responsibility of producing members of society who will have the skills required to be effective citizens of the 21st century (Plourde & Alawiye, 2003).

These changes that have been overlapped with the teaching programs we have been practicing in Elementary Education Department of Education Faculty of Uludağ University. In Science teaching courses constructivist theory and teaching methods based on this theory.

Also science process skills and their importance are considered in detail. Practicing scientific processes skills are presented to the students. Because if educators do not change the way they come at the educational process, they will indeed maintain and support the status quo (Plourde &, Alawiye, 2003). Thus, pre-service teachers are provided with effective science teaching practice skills and knowledge. Effective science teaching gives the learners the opportunity to learn and considers how they learn.

2. Method

The sample of the research was a total of 157 third year pre-service teachers at department of Education Faculty of Uludağ University. 72% of the pre-service teachers are female and 28% of the pre-service teachers are male. Pre-service teachers have received science teaching methodology courses for two terms and participated in two school experience studies.

The content of the classes is in harmony with the new science program, pre-service teachers are informed about the new program in detail; they have prepared the subjects in the program by using the methods they have learned and presented them in the classroom environment in primary schools, thus they have gained various experiences.

Survey method was used in the study. The questionnaire, consisting of open-ended 7 questions, is given to the pre-service teachers at the end of the two terms. It seeks answers to the following questions: 1. How would like to teach science? 2. Which teaching methods you think of using in science and why? 3. How can you make science courses interesting? 4. Do you have any suggestions for the things taught in science classes not to be forgotten? 5. What you would to make students love science classes? 6. What features should the experiments you perform have and think that they would be more effective that way? 7. Do you have any fear or anxiety on carrying out the experiments?

Written responses of the pre-service teachers are examined one by one and the analysis of this qualitative research data divided in categories based on before mentioned questions. Sample expressions that symbolize these categories best are given. Generalizations are made as a result of this categorization.

2. Findings

Table 1 displays the best sample expressions and the categories determined according to the responses of the learners to the first question.

Table 1. Sample expressions and responses to the question "How would like to teach science?"

Categories	*Sample expressions*
Organizing activities and experiments and carrying out the classes in the laboratory	I would like to teach with experiments. Teaching science classes with experiments causes the acquisition of knowledge and skills in the learners by increasing their creativity. Most important of all it gives them the opportunity to activate mental processes.
Carrying out classes that are not solely based on descriptions but related with the daily life	I would like to carry out the classes in an environment in which the students can easily make the experiments on any subject.
Teaching in a way in which scientific process skills are emphasized and not based on memorization	Get the students make connections with the subjects and experiments and their daily lives; make science useful in their daily lives.
Using learner - centered methods	I would emphasize scientific process skills and carry out the classes in a way that will cause the students to gain these skills.
Using out of class activities and excursions	When I become a teacher I would like to carry out the classes in a way where the students are happy and feel better for the things they are able to accomplish by preparing materials and environments that will cause them to discover the subjects instead of the way where students are worried about the problems they can not solve.
	I would like to present the classes with activities that are learner-centered and emphasize the creative skills of the learners.
	I would like to present science classes by using ample amount of materials and in a way where students can discover themselves. I would like to use the methods that keep students active join the classes. I would like to employ methods that will capture the attention of the learners, keep them active and at the same time entertain them.

Table 2. The Answers to the questions "Which teaching methods you think of using in science and why?" and the rationales

The methods they think of using in science courses	*Rationale*
Inquiry Teaching	Full learning takes place. Learner is active and the cognitive, perceptive and psychomotor skills of the learner develop. Learner is constantly active, reaches the knowledge and takes it. Learning science by doing is the most effective.
Learning Cycles (5E, 7E)	Encourages learning. Learner takes the knowledge and it is motivating. It increases creativity.
Cooperative Learning	Active participation of the students is primary. Interaction among learners is important. Learners can easily display their creativity and skills.
Problem solving	They learn to solve problems they have throughout their lives. They develop their cognitive and research skills.

As seen in Table 1 there are five categories. Some students mentioned two or more categories simultaneously. When Table 1 is examined, it is seen that mostly pre-service teacher would like to teach science classes with the emphasis on experiments and practice.

The second question is "which teaching methods you think of using in science and why?" indicated in Table2. As seen in Table 2 pre-service teachers have preferred four methods. Pre-service teachers have preferred contemporary methods that are based on constructivist model and they have indicated that they would like to employ inquiry teaching method mostly.

Pre-service teachers were asked how they can make science classes interesting and their responses are listed in Table 3.

Table 3. The responses to the question 'How can you make science courses interesting?' and related frequencies

Response Categories	*F(%)*
By giving importance to attention and motivating and by doing many activities on the same subject	90
By giving importance to associating with life	54
By bringing interesting materials into the classroom	16
By making experiments with unexpected results, turning the classes into fun and talking about events that make students curious	13
By preparing lessons that address the needs and interests of the students	8
By using internet and science and technology journals for children	8
By using teaching methods effectively	5
By telling the lives and inventions of the scientists	2

According to Table 3, pre-service teacher indicated more than one category. Pre-service teacher have common opinions on making the classes as visual as possible by motivating and attracting attention and on presenting the classes by making references to the daily life.

The responses to the question four "do you have any suggestions for the things taught in science courses not to be forgotten?" are examined and some sample responses are given below:

- Ample amount of repetition and activities that increase the permanence prevent forgetting;
- After teaching a certain subject, I ask related questions and I repeat the unclear parts;
- If the subject is reinforced with examples from their daily lives or if previous knowledge is reminded while presenting the new subject by making references to the previous units, the probability of forgetting decreases;

- I try to prove the students that they would encounter what they learn in science classes in different parts of their lives by paying attention to the fact that subject and examples are related with the daily life;
- I think processing the knowledge in the memory and using appropriate teaching methods provides both making references to the daily life and not forgetting;
- Carrying out classes that largely rely on experiments prevents forgetting;
- I would carry out classes that are fun and learner-centered. Because keeping the students active is very important;
- For not forgetting the things they have learned, I would ask them to write the results of the activities performed as a report and hang these reports on the notice board of the class.

It is determined that what the pre-service teacher mention in their explanations most are by paying attention to the fact that subjects and examples are related with their daily lives, carrying out the classes with the emphasis on experiments and showing the students that they would face with what they learn in science classes in different parts of their lives.

Fifth question addressed to the pre-service teachers was "what they would to make students love science courses?".

The responses to this question are:
- Increasing their interest by decreasing their fear of mark and turning science class into a skill course;
- Not following the course book line by line and making references to the other courses;
- When I was a student I disliked science classes, but I liked the experiments based on invention and even I liked the course. Therefore I would apply this method;
- We should unite it with the lives of the students; give examples related with real life and make experiments so that the students like the course;
- I think the attitude of the teacher is very important;

- We shouldn't be satisfied with the experiments in the books only; instead we should find and carry out different experiments from other sources and internet;
- I would present the subject by taking the needs and interests of the students into consideration;
- I would encourage my students for making research.

Most of the pre-service teacher indicated the need to unify science courses with the daily life and to make interesting and enjoyable experiments.

The responses to the question six "What features should the experiments you perform have and think that they would be more effective that way" are displayed in Table 4.

Table 4. Response categories for the question 'What features should the experiments you perform have and think that they would be more effective that way' and sample statements that represent these categories best

Categories	*Sample statements*
Experiments that are interesting, enjoyable, raise the interest of the students, with surprise results and related with the events the students encounter in their daily lives.	I would make experiments related with the events that they are interested in their daily lives, such as the formation of the rainbow. Therefore I would make them like science classes. The subject of the experiment should capture the attention of the students and they should need the knowledge that will be attained at the end of the experiment. I think such experiments are effective in learning. I would perform experiments with unexpected results. For example, causing the egg put on the brim of the bottle to fall into the bottle by burning a piece of cotton in the bottom.
Experiments that are made by using the simple equipment that can be found in the environment	I can make science classes enjoyable and interesting by making them perform experiments with the simple equipment that can be found easily. We can develop their creativity by showing them that it is possible to make experiments with the simple equipment they use in their daily lives.

Experiments that develop the creativity and problem solving skill of the students	I would make them perform experiments in which students have the leading role, participate actively and show their creativity. The students should attain the knowledge themselves at the end of the experiment. The experiment should lead them into thinking and making research.
Hypothesizing and testing	The students can be given the equipment of the experiment and asked to design and perform it; this is very important for the development of creativity.

When the given responses are examined, it is seen that the features given in the table-4 are seen most in the responses of the pre-service teacher. These features indicated open-ended experiments. Also pre-service teacher indicated that experiments have an important role in teaching science.

The responses of the pre-service teachers to the question seven 'do you have any fear or anxiety on carrying out the experiments' are generally as below:

- I am not afraid or anxious. I can use the computer for difficult experiments;
- I would not feel afraid or anxious if I am prepared, that is if I make the experiment before and know the result and how to do it;
- I do not have such fear or anxiety due to the new science content. Because it is simpler and as I will be using handy materials it is easy to make experiments;
- I feel anxious if I am inadequate about the subject;
- Not finding laboratories and equipment worries me;
- I am anxious because I am inexperienced and inadequate;
- I am afraid of making mistakes while performing the experiments.

Most of the pre-service teacher indicated that they are not afraid or anxious. They mentioned that they gain adequate amount of experience during their teacher education.

4. Discussion and conclusion

According to Table 1, it is seen that mostly pre-service teacher would like to teach science classes with the emphasis on experiments and practice. In Doyle's (1997) study, four themes about learning and teaching are determined. Many pre-service teachers described the act of learning as receiving information whereas some of them described it as exploring, discovering and understanding. Again, many pre-service teachers described the act of teaching as transmitting knowledge to the other party whereas some of them described it as making learning easier with the guidance of the teacher. The latter descriptions for both the act of learning and the act of teaching are in accordance with the findings of the present study. Lowery (2002) asked pre-service teachers about the most important aspects that the teacher should know while teaching science-mathematics and received responses such as teachers should work with students using hands-on and real world situation, make lessons relevant and challenging realize that abstracts concepts are hard and solve ample amount of problems. The responses are in accordance with the findings of the present study.

When analyzed Table 2, it is seen that pre-service teachers have preferred contemporary methods that are based on constructivist model and they have indicated that they would like to employ inquiry teaching method mostly. This result overlaps with Pekmez & Can's (2007) and Saban's (2003) findings. According to Pekmez & Can, pre-service teacher have positive thought about constructivism and think that they should develop their teaching activities based on this approach**.** In Saban's study students prefer learner-centered approaches more than knowledge transfer.

The given results in Tables 1 and 2 display clear clues on this issue. One of the results of Howes' (2002) study is that pre-service teacher prefer inquiry teaching method when teaching science for all. As seen is this study as well, it is surely promising that pre-service teacher prefer this certain method because

many teachers avoid using inquiry teaching method due to the reasons such as it's being time-consuming, not being able to change learning habits easily, not being able to find suitable laboratory equipment, students' being immature, not being able to control the class properly (Lawson, 1995). Damnjanovic (1999) compared the attitudes of pre-service teacher and in-service teachers towards inquiry based teaching and as a result indicated that teacher trainees do not make discrimination between contemporary and traditional methods; however, in-service teachers look more positive to using contemporary methods in science teaching. Plourde & Alawiye (2003) investigated the relation between the beliefs of pre-service teacher on constructivist approach and what they do in practice and found out that there is a strong positive relation between the two. This result is another indicator of how important the quality and adequacy of the knowledge received during teacher training education on this issue are. One of the methods projected in the study is learning cycles. Learning cycles are consisted of constructivist, inquiry and cooperative methods. Doyle (1997) found out that pre-service teacher considered teaching as a passive act and that they would feel more successful when they employed active teaching techniques. A few students (3 pre-service teachers) suggested presentation method but they did not state any rationale.

Mellado (1998) mentioned the presence of some studies which indicate that pre-service teacher bring the opinions, concepts and attitudes regarding learning and teaching with them when they start their university education and that these opinions, concepts and attitudes are strictly reserved and therefore would not change throughout their university education. Thus, based on this, as pre-service teacher come with such thoughts, the first thing that needs to be done regarding learning and teaching of science during their university education is to encourage them to find the best and the most suitable according to themselves. In fact, this seems to be the best solution. Because the education system in Turkey was teacher-centered until recently; the pre-service teachers in the present study were educated in such an education model. However, op-

posite of what is mentioned above, they are rejecting teacher-centered methods and support more effective and contemporary models.

When the given responses are examined, it is seen that the features given in the table-4 are seen most in the responses of the pre-service teacher. These features indicated open-ended experiments. Also pre-service teacher indicated that experiments have an important role in teaching science. According to Fraser & Walberg (1995), experiments play a key role in teaching and learning science in traditional and constructivist settings.

Only a few pre-service teacher mentioned fear and anxiety. Also they mentioned over confidence and adequate in experimenting. This result agrees with Küçükyılmaz & Dubans' (2006) results. In their study, many of students (%94) find themselves adequate in experimenting. Also they indicated that they would not have such a problem if they know the source of their fear and anxiety and eliminate the causes of this situation; the given responses prove that they are aware of how they can attain this, for instance being inexperienced or inadequate. This is a pleasing result for us as well because it is seen that the fear and anxiety of working in the laboratory occupy important place in the literature.

This study tries to display the opinions and views of the pre-service teacher on science learning and teaching. The results are important because the most important factor in the development of education is the teacher. Today, it is seen that interpreting, comprehending scientific concepts and developing research skills are more important than knowing scientific knowledge and events. Additionally, based on the new 2005-2006 education program put into practice, further studies can be carried out with in service teachers to investigate the results brought by the change and with students to find out their opinions on success, interest and attitude.

NOTES

1. Report on re-designing the teacher education programs at the faculties of education in Turkish Universities. YOK, Ankara, 1997.
2. http://ttkb.meb.gov.tr/ogretmen/modules.php?name=Downloads&d_op.=viewdownload&cid=48

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AN EXAMINATION OF DEMOCRATIC ATTITUDES OF PRIMARY SCHOOL TEACHERS

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Abstract. As democracy can develop better in a society of democratic people, democracy education can also get its intended goals better in a democratic school environment. As the most influential people in a school environment were teachers, this study, too, aimed to determine their levels of democratic attitudes. In the present study, 60 primary school teachers working in the schools attached to the Bursa Metropolitan Municipality were surveyed. The relationships between their attitudes and some variables were studied. These variables included school they work, age, gender, marital status, number of children they have, education level, teaching experience and number of brothers or sisters. The questionnaire used for this study was validated by Aydogan & Kukul (2003) based on previous studies made by Gomleksiz (1988), Yildirim (1994) and Atasoy (1997). For the validity of the questionnaire, Cronbach Alpha coefficient (0.829) was calculated. The results suggest that teachers show very positive attitude with a score of 103. When the items were examined individually, some significant relationships were found with the variables. Teachers should have positive democratic attitudes in order to give lessons of democracy to their students. An appropriate and encouraging envi-

ronment should be prepared in order for students to gain desired democratic outcomes. In a democratic environment, teachers' positive attitudes will help their students to gain critical thinking skills, effective discussion skills, capability for fighting against inequity, cooperation and collaboration skills, and showing empathy and respect for diversity.

Keywords: democratic attitudes, primary school teacher, democracy education

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Introduction

The most important resource for a country to achieve modern social, economic and technological levels that it aims to reach is the human quality. For this reason, human resources must be well-trained. The educational system is the maim factor to train the human quality (Aycan, 1997). The first of the most important institutions affecting the development and socialization of an individual is the family and the second is the school. Learning experiences at school will help the child or the adolescent acquire academic information and skills and develop an active, emotionally and socially stable personality capable of adapting to society (Gözütok, 1995).

Democracy can survive and develop only in the societies composed of individuals having internalized democracy as a course of conduct and implementing democratic principles in their lives. In this sense, maintaining democracy can be achieved through training individuals to adopt democratic values, in other words, through democracy education (Gömleksiz, 1988). Gözütok (1995) points out that democracy education aims to help individuals become active citizens knowing, adopting, respecting and advocating human rights and freedoms.

In a modern society, school does not aim to train individuals just to consume the available information, but to produce new information, using it to

solve problems and make independent decisions based on information, learning continuously and open to development (Doğanay, 2000). Democracy education, too, aims at training individuals to posses these characteristics. Accordingly, to create a modern society, understanding of democracy and democracy education must be closely related.

For democracy education to be able to reach its aim there must be a democratic environment. The benefits of democracy education, according to Magendzo, can be mentioned as follows (Cited by Yeşil, 2002): (1) It helps individuals develop their abilities of criticizing and inquiring; (2) Schools are compelled to follow the developments in both overt and covert programs and do what is required. Thus, they become institutions which are open to changes and follow developments. These changes and developments are not only associated with contents but also with methodology and evaluation; (3) Democracy affects school culture and becomes a way of life first at schools then in the whole society; (4) The introduction of democracy to schools pioneers a deep and real educational reform.

According to Kepenekçi (2006), the followings are the factors making a school democratic: i) achieving a reciprocal communication away from violence but based on love, respect, understanding and tolerance aimed by all people in a school and classroom environment; ii) achieving participation by all the members of a school (teacher, student and parent) to decisions that are of interest to themselves in both school and classroom managements.

This matter lies within the responsibility of teachers who are the most important and effective element of the educational process. The most important element developing the democratic values that young people acquire in family is the teacher. The success of an educational system depends mainly on the types of qualities its teachers and other staff is supposed to process in order to implement that very system. For this reason, it can be stated that a school is good to the extent to which the teachers working there are good (Büyük-

karagöz & Üre, 1994). Küçükahmet (1989) denotes that democratic individuals can be trained at schools only by teachers having internalized democracy and teachers' behaviors have effects on students; and there are more than 2000 studies indicating the fact that if these behaviors are repeated they are likely to be observed in students. In a study of hers, she emphasizes the importance of the fact that teachers should exhibit democratic behaviors while giving their students democracy education. Thus, she indicates that there is a positive relationship between a teacher's being democratic and students' behaving in a democratic way.

A teacher should be conscious of what must be done to develop a democratic life culture and entrenching ethical and moral behaviors. Teachers should be the most fundamental supporters of democratic life by showing their attaching importance to democratic principles not only with their words but also with their behaviors. Furthermore, a good teacher should prepare an incentive environment and provide students with appropriate opportunities so that they can realize their democratic acquisitions. In a formal educational institution accepted as the most fundamental element in having individuals acquire democratic attitudes and behaviors, these attitudes and behaviors are achieved, with no doubt, through the model attitudes and behaviors exhibited by teachers (Genç, 2006).

In the democratic education, education has the individual, in other words, the student at its center. Each individual is accepted as a unique personality and shown respect. Since it is the members of a society who make decisions in democracies, the actual element is the student in the democratic education. The teacher is no longer a person giving a lesson in a classical meaning and teaching students something, but has turned out to become a person helping students to access information and learn it, guiding them, planning activities and having them participate to planned activities actively, and in summary, teaching them how to learn (Çağlar, 1997). In a democratic educational institu-

tion, the teacher is expected to help students to develop personalities appropriate for their abilities and dispositions by perceiving them as values different from one another and to mature with the feelings of self-confidence and self-respect. In the democratic educational process, students, on the one hand, are taught by having them to comprehend precise information included in various branches of science, and on the other hand, they are helped to acquire a habit of accessing information by themselves and a capability of making healthy evaluations. During this educational process, every thought is made open to criticism, examination and discussion by the teacher and the students (Maboçoğlu, 1998). As Başar (2004) states, another characteristic of the democratic educational environment is the respect shown to thinking and freedom of expressing thoughts. Students should be given the opportunity to express what they feel and think about any matter with no hesitation, make criticisms and exhibit an attitude which is open to criticism and discussion. Raising individuals possessing these characteristics depends on the suitability of the educational environment. The teacher as the most effective and important element of the educational process should provide a democratic environment. The attitude exhibited by the teacher toward the student desiring to express his or her thoughts, making criticisms, claiming his or her rights, inquiring and searching will, of course, has influence on the whole class, and either help them take a step in the way toward becoming democratic individuals or hinder them. According to Ulusavaş, in the democratic education, the teacher will help students to acquire the skills of thinking critically, discussing effectively, struggling against inequity, working cooperatively and with solidarity, and will provide them with acquisitions on the matters such as feeling empathy, identity achievement and self-actualization, action-taking, participation, respecting to differences, being prepared to work for a better world, developing responsibility by thinking of both today's and future generations, etc. (Ulusavaş, 1998). According to Cangelosi (Cited by Başar, 2004), in a democratic classroom environment, the teacher should be neither authoritative nor permissive. The

student should have the right to speak while determining classroom rules, and be motivated to his or her work in order not to get a reward or punishment but with the awareness of the real benefits of his or her work and through participating to its processes. The teacher as a democratic leader asks students for their opinions, comes to terms with them about what to be done and gives them the right to choose their own studying arrangements.

As San (1985) specifies, "democratic attitudes and behaviors" is a system that can be learned and adopted through practicing in daily life. Consequently, first of all, teachers should exhibit democratic attitudes and behaviors. The present study aims to investigate into the extent to which the classroom teachers working in elementary schools exhibit democratic behaviors and if these behaviors vary depending on the factors such as the length of service, gender and age.

For this purpose, answers for the following questions were sought: i) do teachers' democratic attitudes vary according to the levels of schools from which they graduate? ii) do teachers' democratic attitudes vary according to the length of their service? iii) do teachers' democratic attitudes vary according to their age and gender? iv) do teachers' democratic attitudes vary according to their marital statuses or having children statuses? v) Do teachers' democratic attitudes vary according to the SES levels of the school in which they work?

Method

In the present study the democratic attitudes of the participant teachers were determined through using questionnaire and evaluated according to proper variables.

Sample

The population of the present study is limited to the total of 60 teachers working in the primary schools attached to the Bursa Metropolitan Municipality. The schools were separated into three groups according to their socio-economic levels as low, mid and high and 20 teachers from each group were selected for the purpose of the study.

Data collection tool

To collect data for the study, the questionnaire technique was used, and to obtain personal information about the teachers, the personal information form developed by Gözütok (1995) was used by adding the item "more than 21-25 years" to the item of the questionnaire inquiring the length of service. No new questionnaire was formed for the study. The questionnaire was validated by Aydoğan & Kukul in 2003 in the study entitled "Analysis of Democratic Behaviors of Teachers and Lecturers" based on the studies by Atasoy (1997), Gömleksiz (1988), and Yıldırım (1994). The questionnaire included 24 items and scoring for each item was made as shown (Never: 1; Rarely: 2; Sometimes: 3; Frequently: 4; Always: 5). For the reliability of the questionnaire, the Cronbach Alpha coefficient was calculated and found to be 0,829.

The data of the study was evaluated with using SPSS 13.0 statistical package program. Taking the aims of the study into consideration, the frequencies and distributions of the data were examined.

Findings and interpretation

When the answers given to personal information were examined, it appeared that 53.3 % of the teachers were females and 46.7 % were males. Taking the marital statuses of the teachers, it appeared that 93.3 % of them were

married and 6.7 % were single. While 93.3 % of the teachers had children, 6.7 % of them had no children. 90 % of those with children had 1-3 child/ren, 3.3 % of them had 4–6 children. When the educational statuses of the teachers were examined, it appeared that 3.3 % of them were the graduates of primary teacher's training school, 50 % of them had associate degrees and 46.7 % of them had bachelor's degrees.

Table 1. *Distributions of the teachers according to the variables of age and length of service*

Age	f	%	Service period	f	%
26-30	2	3,3	0-5	1	1,7
31-35	6	10	6-10	5	8,3
36-40	18	30	11-15	14	23,3
41-45	14	23,3	16-20	14	23,3
46-50	14	23,3	21-25	23	38,3
51 and over	6	10	25 and over	3	5
Total	60	100	Total	60	100

As seen in Table 1, 30 % of the teachers are aged between 36–40 years, 23.3 % of them are aged between 41–45 years, 23.3 % of them are aged between 46–50 years, 10 % of them are aged between 31–35 years, 10 % of them are aged 51 years and over and 3.3 % of them are aged between 26–30 years. While 38.3 % of the teachers have a service period of 21–25 years, 23.3 % of them have 11–15 years, 23.3 % have 16–20 years, 8.3 % have 6–10 years, 5 % have more than 21-25 years and 1.7 % has 0–5 year/s of service period.

As for the socio-economic statuses of the districts where the schools in which the teachers work are situated, since no random sampling was made, a distribution of 33.3 % is observed among all the schools with low, mid and high socio-economic statuses.

In the light of the data obtained, the democratic attitude scores obtained by the teachers were found to be 103 in average, 118 at the highest, and 84 at the lowest. When the fact that "120" is the highest score which can be obtained from the questionnaire is taken into consideration, the mean of the democratic attitude scores of the teachers indicates that the teachers exhibit democratic behaviors "frequently". The analyses made to achieve the second aim of the study indicate that there is no relationship between attitude scores and the length of service.

When the answers given to the items were examined one by one, it appeared that the answer "never" was given to the item "Using the response by the class to an unwanted behavior as a sanction power" most frequently with a percentage of 13,3. The item to which the answer "always" was most frequently given with a percentage of 66,7 was the item "Resorting to student voting about matters requiring a co-decision by the class".

Examination of democratic attitudes of teachers according to some variables

The findings obtained following the examination of the relationship between the teachers' graduation levels and their answers to the items are as below:

Following the "cross-tabulation" and "chi-square" analyses made between the information included in the personal information form and some items of the questionnaire, there appeared a significant relationship between the answers given to the item "Abstinence to blame students for their thoughts" and the teachers' graduation levels. 50 % of the teachers who are the graduates of primary teacher's training school marked "never" and 50 % marked "frequently"; 3.3 % of those who have an associate degree marked "sometimes", 43.3 of them marked "frequently" and 53.3 % marked "always";

3.57 % of those who have a bachelor's degree marked "never", 46.4 % of them marked "frequently" and 50 % marked "always".

Table 2. *Findings indicating the relationship between the given answers to the item "Making your students feel that their thoughts are valued, cared or accepted" and the teachers' graduation levels*

	Making your Students Feel that their Thoughts are Valued, Cared or Accepted			
Graduation level	Frequently	Sometimes	Always	Total
Primary teacher's training school	1	0	1	2
	%50	0	%50	%100
Associate Degree	0	14	16	30
	0	%46,6	53,3	%100
Bachelor	2	6	20	28
	%7,14	%21,4	%71,4	%100

A relationship was observed between the answers given to the item "Making your students feel that their thoughts are valued, cared or accepted" and the teachers' graduation levels. 50 % of the teachers who are the graduates of primary teacher's training school marked "sometimes" and 50 % of them marked "always"; 46.7 % of those who have an associate degree marked "frequently" and 53.3 % of them marked "always"; 7.14 % of those who have a bachelor's degree marked "sometimes", 21.4 % of them marked "frequently" and 71.4 % marked "always".

When we examined the answers given to the item "Abstinence to reveal personal information about students", we found a significant difference with respect to their graduation levels. It was found that 50 % of the teachers who are the graduates of primary teacher's training school marked "rarely" and 50 % of them marked "always"; 43.3 of those who have an associate degree marked "frequently" and 56.6 % of them marked "always"; 3.57 % of those

who have a bachelor's degree marked "sometimes", 28.57 % marked "frequently" and 67.8 % marked "always".

The findings obtained following the examination of the relationship between the socio-economic statuses of the schools in which the teachers work and their answers to the items are as below:

Table 3. *Findings Indicating the relationship between the given answers to the item "Determining the rules to be obeyed at school and in the classroom together with students" and the socio-economic statuses of the schools*

Socio-Economic Statuses	Determining the Rules to be Obeyed at School and in the Classroom together with Students				
	Rarely	Sometimes	Frequently	Always	Total
Low		5 %25	5 %25	10 %50	20 %100
Middle	2 %10	3 %15	11 %55	4 %20	20 %100
High			10 %50	10 %50	20 100
Total					

When the answers given to the item "Determining the rules to be obeyed at school and in the classroom together with students" were examined with respect to the socio-economic statuses of the schools in which the teachers work, it was observed that 25 % of the teachers from low socio-economic group marked "sometimes", 25 % marked "frequently" and 50 % marked "always"; 10 % of the teachers from middle socio-economic group marked "rarely", 15 % marked "sometimes", 55 % marked "frequently" and 20 % marked "always"; 50 % of those from high socio-economic group marked "frequently" and 50 % marked "always". Following the analysis made in relation to the socio-economic statuses of the schools in which the teachers work,

it was observed that the teachers' answers did not vary significantly with respect to the school in which they work.

The findings obtained following the examination of the relationship between the gender of the teachers and their answers to the items are as below:

According to another cross-tabulation analysis, 90.7 % of the female teachers marked "frequently" and "always" for the item "Determining the rules to be obeyed at school and in the classroom together with students", and 75 % of the male teachers marked "frequently" and "always", and therefore, the result was observed to be in favor of the male teachers.

The relationship between the democratic attitude scores of the teachers and their gender was determined by using t-test and no relationship was found, so much so that the mean of the attitude scores of the male teachers was 100, 9 while that of the female teachers was 101, 8.

The findings indicating the relationship between the age of the teachers and their answers to the items are as below:

Table 4. *Findings indicating the relationship between the answers given to the item "Providing students with group work in classroom demonstrations and other group activities in accordance with their demands" and the age of the teachers*

		Providing students with group work in classroom demonstrations and other group activities in accordance with their demands				
Age		Rarely	Sometimes	Frequently	Always	Total
26-30	f	1	0	1	0	2
	%	50	0	50	0	100
31-35	f	0	3	3	0	6
	%	0	50	50	0	100
36-40	f	0	4	7	7	18

41-45	%	0	22,2	38,9	38,9	100
	f	0	3	8	3	14
46-50	%	0	21,4	57,1	21,4	100
	f	0	0	12	2	14
51 ve üzeri	%	0	0	85,7	14,3	100
	f	0	1	4	1	6
	%	0	16,7	66,7	16,7	100

Whether there is a relationship between the age of the teachers and their answers to the items was examined and it was found that the result obtained with respect to the item "Providing students with group work in classroom demonstrations and other group activities in accordance with their demands" was in favor of the teachers whose ages ranged between 46-50 years.

The answers given to the item "Determining the rules to be obeyed at school and in the classroom together with students" indicated that the teachers aged between 31–35 years, 46–50 years, and 51 years and over marked the alternatives "frequently" and "always" more than those from the other age groups.

Another significant difference was observed between the answers given to the item "Holding a classroom discussion and making a co-decision about the possible reason(s) for a behavior exhibited by a student or some students against the determined school or classroom rules". For this item, a result was found in favor of the teachers aged between 31–35 and 36–40 years. However, no significant relationship was found between the ages of the teachers and their attitude scores.

The findings indicating the relationship between the marital statuses of the teachers and their answers to the items are given below:

Following the "chi-square" analysis made with respect to marital statuses of the teachers, a result was found in favor of the married ones mark-

ing the alternatives “frequently” and “always” for the item “Providing students with group work in classroom demonstrations and other group activities in accordance with their demands” with a difference of 32 %. According to the result of another analysis, a result was obtained in favor of the married teachers marking the alternatives “frequently” and “always” for the item “Abstinence to blame students for their thoughts” with a difference of 21.4 %. The result was in favor of the married teachers with a difference of 25 % for the item “Spending effort to have students respect to others’ thoughts”.

From the analysis made, the result was found to be again in favor of the married teachers marking the alternatives “frequently” and “always” for the item “Resorting to student voting about matters requiring a co-decision by the class” with a difference of 23 %. When their marital statuses were examined, it was found that 56 % of the teachers were married and 4 % were single and no significant difference was found between their attitude scores. Also, no significant difference was found in terms of the number of brothers or sisters they have.

The findings indicating the relationship between having children statuses of the teachers and their answers to some of the items are as below:

From the results obtained from the study, it appeared that the teachers having children were observed to mark the alternatives “frequently” and “always” with a difference of 35.8 % for the item “Determining the rules to be obeyed at school and in the classroom together with students”, with a difference of 21.4 % for the item “Abstinence to blame students for their thoughts”, with a difference of 25 % for the item “Spending effort to have students respect to others’ thoughts”, with a difference of 35.7 % for the item “Holding a classroom discussion and making a co-decision about the possible reason(s) for a behavior exhibited by a student or some students against the determined

school or classroom rules", with a difference of 66 % for the item "Taking into consideration the opinions and suggestions of the students who are few in number in the classroom and opening a discussion on them", and finally with a difference of 23 % for the item "Resorting to student voting about matters requiring a co-decision by the class". And this indicates that having children status has a positive effect on having a democratic attitude and this might be related to the fact that teachers who are "mothers" or "fathers" are capable of establishing a rapport with their students, and also they behave towards them as they do to their own children.

Following the results obtained in favor of the teachers with children, another analysis was made considering the number of children they have. The results obtained through this analysis are as below: The result(s) obtained for the item "Providing students with group work in classroom demonstrations and other group activities in accordance with their demands" were in favor of those with 1–3 children, for the item "Abstinence to blame students for their thoughts" were in favor of those with 4–6 children, for the item "Spending effort to have students respect to others' thoughts" were in favor of those with 4–6 children, for the item "Holding a classroom discussion and making a co-decision about the possible reason(s) for a behavior exhibited by a student or some students against the determined school or classroom rules" were in favor of those with 1–3 children, for the item "Taking into consideration the opinions and suggestions of the students who are few in number in the classroom and opening a discussion on them" were in favor of those with 1–3 children, and for the item "Resorting to student voting about matters requiring a co-decision by the class" were in favor of those with 4–6 children.

For another purpose of the study, the analysis indicating the relationship between the service length of the teachers and their answers to the items was also examined, but no significant result was obtained.

Conclusion and suggestions

Let us summarize the results obtained: (1) The mean of the democratic attitude scores obtained by the teachers was 103 out of 120, the highest score that could be obtained from the democratic attitude questionnaire, and the highest score obtained by the teachers was 118 and the lowest one was 84. Based on this, it can be concluded that the democratic attitude scores of the teachers are high; (2) The democratic attitude scores of the teachers varied for some items depending on their graduation levels. The answer "always" to the item "Abstinence to blame students for their thoughts" was given mostly by those having an associate degree, the same to the item "Making your students feel that their thoughts are valued, cared or accepted" was given mostly by those having a bachelor's degree, and lastly to the item "Abstinence to reveal personal information about students" mostly by those having a bachelor's degree; (3) When the relationship between the gender of the teachers and their answers to the item "Determining the rules to be obeyed at school and in the classroom together with Students" was examined, the result was found to be in favor of the female teachers. The analysis made with respect to the age of the teachers yielded results in favor of those aged between 46-50 years for the item "Providing students with group work in classroom demonstrations and other group activities in accordance with their demands", and in favor of those aged between 31-35 years for the items "Determining the rules to be obeyed at school and in the classroom together with students" and "Holding a classroom discussion and making a co-decision about the possible reason(s) for a behavior exhibited by a student or some students against the determined school or classroom rules"; (4) The relationship between the teachers' answers and their marital statuses showed itself in the results found to be in favor of the married ones for the items "Providing students with group work in classroom demonstrations and other group activities in accordance with their demands", "Abstinence to blame students for their thoughts", "Spending effort to have students

respect to others' thoughts", and "Resorting to student voting about matters requiring a co-decision by the class".

When the teachers were compared according to their having children statuses, the results were found to be in favor of those with children with a difference of 35.8 % for the item "Determining the rules to be obeyed at school and in the classroom together with students", with a difference of 21.4 % for the item "Abstinence to blame students for their thoughts", with a difference of 25 % for the item "Spending effort to have students respect to others' thoughts", with a difference of 35.7 % for the item "Holding a classroom discussion and making a co-decision about the possible reason(s) for a behavior exhibited by a student or some students against the determined school or classroom rules", with a difference of 66 % for the item "Taking into consideration the opinions and suggestions of the students who are few in number in the classroom and opening a discussion on them", and with a difference of 23 % for the item "Resorting to student voting about matters requiring a co-decision by the class"; (5) A relationship was found between the socio-economic statuses of the schools in which the teachers work and the answers given to the item "Determining the rules to be obeyed at school and in the classroom together with students". The answer "always" was given mostly by the teachers working in the schools with "high" socio-economic level.

Based on the findings obtained from this study, the following suggestions can be offered: i) Since teachers are one of the most important factors in the process of having students internalize democracy, firstly they themselves should internalize democracy and be aware of the fact that they should act as a model; ii) The fact that teachers should appreciate students' thoughts and include them in the decision-making process in the classroom can be emphasized; iii) The teacher should not determine the classroom rules by himself or herself, instead he or she should determine them together with students and he or she should obey the determined rules as well. The rules determined by the

teacher himself or herself are usually perceived by most students as the prohibitions that can be violated; iv) This study made with classroom teachers can be made with branch teachers as well, and the relationship between the democratic attitude scores of classroom teachers and those of branch teachers can be examined.

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APPENDIX

Answers given by the classroom teachers to the items indicating their democratic attitudes (first figure: number; second figure: percent)

1. Encouraging all students to participate in classroom and other group activities: never (0,0); rarely (0,0); sometimes (3,5); frequently (38, 63.3); always (19,31);
2. Resorting to students' opinions while selecting objectives, contents, methods and toola for the lessons taught in the classroom and other group activities: never (0,0); rarely (2, 3.3); sometimes (15, 25); frequently (36, 60); always (7, 11.7);
3. Providing students with group work in classroom demonstrations and other group activities in accordance with their demands: never (0,0); rarely (1, 1.7); sometimes (11, 18.3); frequently (35, 58.3); always (13, 21.7);
4. Resorting to students' opinions for the arrangement of seating in the classroom: never (1,1.7); rarely (5, 8.3); sometimes (16, 26.7); frequently (25, 41.7); always (13, 21.7);
5. Determining the rules to be obeyed at school and in the classroom together with students: never (0,0); rarely (2, 3.3); sometimes (8, 13.3); frequently (26, 43.3); always (24, 40);
6. Asking students for their opinions while determining the kinds and dates of exams: never (0,0); rarely (6,10); sometimes (17, 28.3); frequently (24, 40); always (13, 21.7);
7. Referring to classroom activities, obeying the decisions made by the majority of the class: never (0,0); rarely (0,0); sometimes (10, 16.7); frequently (41, 68.3); always (9, 18);

8. Instead of telling students whas is right and what is wrong and having them do it, guiding them to generate their own ideas: never (0,0); rarely (0,0); sometimes (2, 3.3); frequently (37, 61.7); always (21, 35);
9. Enabling students to evaluate events objectively and ctitically: never (0,0); rarely (0,0); sometimes (5, 8.3); frequently (35, 58.3); always (20, 33.3);
10. Providing students with the opportunity to express their own opinions freely under no effect: never (1, 1.7); rarely (0,0); sometimes (1, 1.7); frequently (23, 38.3); always (35, 58.3);
11. Abstinence to blame students for their opinions: never (2, 33); rarely (0,0); sometimes (1, 1.7); frequently (27, 45); always (30, 50);
12. Welcoming students' advocating their own thoughts against yours with maturity: never (0,0); rarely (0,0); sometimes (3,5); frequently (24, 40); always (33, 55);
13. Making your students feel that their thoughts are valued, cared or accepted: never (0,0); rarely (0,0); sometimes (3, 5); frequently (20, 33.3); always (37, 61.7);
14. Encouraging students to express their opinions on the matter about which they know less or nothing: never (0,0); rarely (2, 3.3); sometimes (23, 38.3); always (33, 55);
15. Waiting for students to complete what they are saying even if it wrong: never (0,0); rarely (0,0); sometimes (1, 1.7); frequently (28, 46.7); always (31, 51.7);
16. Spending effort to have students respect to others' thoughts: never (0,0); rarely (0,0); sometimes (1, 1.7); frequently (20, 33.3); always (39, 65);

17. Holding a classroom discussion and making a co-decision about the possible reason(s) for a behavior exhibited by a student or some students against the determined school or classroom rules: never (0,0); rarely (2, 3.3); sometimes (8, 13.3); frequently (30, 50); always (20, 33.3);

18. Using the response by the class to an unwanted behavior as a sanction power: never (8, 13.3); rarely (6, 10); sometimes (13, 21.7); frequently (27, 45); always (6, 10);

19. Taking into consideartion the opinions and suggestions of the students who are few in number in the classroom and opening a discussion on them: never (0,0); rarely (0,0); sometimes (8, 13.3); frequently (34, 56.7); always (18, 30);

20. Resorting to student voting about matters requiring a co-decision by the class (e.g., electing the class president): never (0,0); rarely (1, 1.7); sometimes (1, 1.7); frequently (18, 30); always (40, 66.7);

21. Letting students use their rights to vote be secret ballot: never (0,0); rarely (2,3.3); sometimes (8, 30); frequently (17, 28.3); always (33, 55);

22. Allocating time for the discussion of a current event that happened in the classroom with the lesson to be performed: never (0,0); rarely (0,0); sometimes (5, 8.3); frequently (30, 50); always (25, 41.7);

23. Taking students' views while making a classroom arrangement (hanging paintings or pictures on a wall): never (0,0); rarely (0,0); sometimes (11, 18.3); frequently (30, 50); always (19, 31.7);

24. Absistence to reveal personal information about students: never (0, 0); rarely (1,1.7); sometimes (1, 1.7); frequently (21, 35); always (37, 61.7).

THE ROLE OF FIELD CLASSES IN EDUCATION OF PROSPECTIVE TEACHERS IN BIOLOGY

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Abstract. Field classes are indispensable in education of biology and environment protection students, as they allow a future teacher to carry out teaching material bringing together theory and practice through activity. In the framework of Biology Didactics classes the biology students of the Faculty of Natural Sciences at the University of Szczecin participate actively in the works on didactic nature trail in the Arkoñski Woods prepared by Dr. Ewa Fleszar. During the work on didactic natural path the students make themselves acquainted with: field class objectives; field class tasks; field class programmes, e.g. concerning phenology; flora and fauna species. Writing synopsis of field classes for selected lesson units at different teaching levels they acquire sound knowledge based on the ecological contents. Contacts with nature as well as gaining the experience during field classes allow them to obtain competences for working in the field and to understand the objectives of carrying out such classes. Field classes have an effect on developing interests of participants in the subject, and affect the improvement of teaching

performance. Visit to the field forms ecological awareness, which leads to obtaining an ecological culture.

Keywords: field classes, flora, fauna, natural didactic path

Introduction

Biology students of the Faculty of Natural Sciences at the University of Szczecin participate actively in the framework of Biology Didactics classes in the works on natural didactic path in the Arkoñski Woods proposed by Fleszar (2004) and Gwardys-Szczęsna (2004). According to Stawiñski (2000) we call didactic paths the routs marked out specially for didactic purposes with a length of 2 to 6 km. They are established in national parks and reserves, landscape parks or culture and recreation parks, botanical gardens and on other grounds with high natural values.

Natural didactic path in Szczecin came into being with the aim to enable teachers and school students to work in the field and learn from nature. School students should verify the acquired theoretical knowledge in the field, e.g., on natural didactic path. They have opportunity and possibility to apply their knowledge in practical action. A huge role is played here by the tasks that are to be carried out, working conditions, factors during work performance and the results (Fleszar, 1996). In this way the students should develop the competence of field work.

Content

During field classes the person conducting them explains their objective and tasks. Field classes should answer the following purposes: (1) show the participants that there are no other way to become entirely familiar with life and structure of domestic flora and fauna without carrying out field classes; (2) justify greater role of field classes in increasing the knowledge in

relation to lessons carried on in school; (3) acquire the knowledge of carrying unaided observation and develop logical thinking; (4) train the knowledge of planning and co-arranging field classes; (5) perfect measurments and results recording; (6) acquire the knowledge of selecting and employing adequate didactic means; (7) develop appropriate attitude towards nature (Fleszar, 1997).

Such a path should serve various tasks: acquaint participants with objects of nature; acquaint participants with different phenomena occurring in nature; enable enjoying the environment according to assigned plan (instructions); enable developing the knowledge of carrying field observation understood as interacting plant and animal complexes and their relationships with the environment; enable acquiring the habits of cultural communication with nature; enable acquiring the habits of responcible behaviour in environment; encourage teachers and school students and the community to enjoy values of nature, at the same time making popular ideas of protecting the nature; enable observing the effects of anthropopressure in ecosystems; enable merging in the process of education the information from different fields of science, such as biology, geography, history, thus stimulating interdisciplinary teaching; enable developing the knowledge of: carrying observations, keeping appropriate documentation, interpreting results, formulating conclusions and their recording, making use of laboratory and field equipment, making use of guides for identification of plants and animals (Fleszar, 1997).

Within the classes students acquaint themselves with field class programmes, e.g. concerning phenology. Phenology is a biological science that sudies relationships between seasonal changes of weather and climatic conditions and terms of periodic phenomena in the lives of organisms, e.g. seasons of plant blooming, leaf falling, bird coming and flight. By reason of educational system reform, phenological studies should find their place in school and out of school education. In school education they should be carried out both within the programme of lesson hours and that outside them, that is

during science interest groups as well as within Leage for the Preservation of Nature (Fleszar, 2000).

Gymnasium curriculum (Fleszar, 2000)

Grade I	
Telomophytae	Observation of blooming season.
Gymnospermae	Observation of showing up cones, bery-like cones
Angiospermae	and seeds Observation of foliage, blooming, fruit showing up, fruit ripening.
Grade II	
Vertebrata. Fish	Observation of young fry (terms).
Amphibians	Observation of depositing spawn by particular species, showing up tadpoles.
Reptiles	Observation of laying eggs (terms). Observation of preying (terms).
Birds	Observation of bird coming and flight (terms). Observation of constructing nests (terms). Observation of leading out young (terms). Observation of waking up (terms). Observation of starting pairing (terms).
Mammals	Observation of migration season (terms).
Grade III	
Protection of environment and human health	Observation of blooming periods in plants (causing alergies)

During carrying on field classes students learn how to assimilate or conceptualize ecological knowledge. Ecological contents are connected with ecological education, which in reformed school expresses them in currical bases as: educational objectives, school tasks,contents, chievements.

Contents should be accomplished in grammar school and gymnasium. These should require planned actions in order the ecological education to be effective. Thus, the programme is assumed to be accomplished continuously and regularly, both during lessons and field classes. Education reform adopts

as its main assumption the adoption of contents in practical action (Fleszar, 2002).

Subject matter of field classes for gymnasium grade III accomplished on natural didactic path

Curriculum section	Topic	Exercises	Knowledge
Ecology	Review of selected plant species growing in different biotopes and their adaptation to environment	Observations of selected plant species growing in the forest, meadow, at the lake, on peat-bog with the help of guides and atlases. Observations of adapatable features of plants to living in a given environment	Making use of Atlases and guides for plant identification. Identifying selected plant species. Showing ecological adaptations of organisms to biotopes. Observing biodiversity in respective plant complexes
	Review of selected animal species	Identification of selected animal species living in the forest, at the lake, in the meadow, on peat-bog with the help of guides and atlases. Observation of adaptable features of animals to living in a given environment	Making use of atlases and guides for animal identification. Identifying selected animal species. Showing ecological adaptations of organisms to biotopes. Observing biodiversity in respective animal groups.
	Factors limiting the occurrence of animals (range of ecological tolerance)	Examination of abiotic factors (temperature, wind, clouds, humidity) in ecosystem	Listing factors limiting the occurrence of animals. Giving examples of the effect of

		(meadow, forest, forest clearing). Determination of general soil properties with the help of plant soil indicators.	environmental factors on species occurrence. Using professional nomenclature.
	Characteristic features of population	Observation of spatial structure of selected plant population (e.g. of the nettle). Calculation of the numbers and the population density of common plant species. Observation of age structure of duckweed population.	Interpreting population features basing on carried out observations. Representing graphically spatial and age structure of population. Formulating conclusions and general statements. Justifying own opinions.
		Observation of the density of plant population and its effect on growth and development of plants	
Protection of environment	Influence of pollutants on ecosystems functioning	Examination of pH reaction of falling off dust (acid, basic) and observation of its effect on plants. Examination of the acidity of precipitation water. Observation of tree leaves insuries caused by strong reaction of sulfur dioxide and chlorine. Determination of the origin of water basing on suspended matters. Determination of the degree of air pollution with sulfur dioxide using lichen scale.	Indicating examples of unfavourable changes occurring in the atmosphere, hydrosphere and lithosphere due to human activity. Carrying on simple observations and experiments referring to the influence of environment contamination on plants and animals. Interpreting the results of observations and experiments. Detecting cause

			and effect relations.
Protection of nature	Species protection of flora and fauna	Identification of protected plant and animal species using guides and atlases. Taking care of stands of protected plants.	Identifying protected plants and animals. Justifying the necessity of protecting vanishing species
		Taking care of protected animals.	Observing the responsibility of people for preservation of biodiversity.

Natural didactic path in the Arkoñski Woods in Szczecin is about 3 km long and runs through picturesque and interesting, in respect of the nature, areas of the forest. There are the following stops along the route of this natural didactic path.

Stop (point) I: eastern white pine Pinus strobus L.

Apart from it, there are other trees, accompanying ones: Norway spruce *Picea excelsa (Lom.*), Douglas fir *Pseudotsuga (taxifolia)* Mirb., Norway maple *Acer platanoides L.*, pedunculate oak v. menziesii, *Quercus robur L* drooping birch *Betula verrucosa Ehrh*. From among birds there are: European jay *Garrulus glandarius (L.),* chaffinch *Fringilla coelebs L.*, blue tit *Parus caeruleus L.*, great tit *Parus major L.,* coal tit *Parus ater L.*, middle-spotted woodpecker *Dryobates medius (L.)* and pied flycatcher *Muscicapa hypoleuca (Pall.).* Out of amphibians there is grey toad *Bufo bufo L.*

Activities of students are: acquainting with field class objectives and tasks; observing terrestial biotope (ecosystem); observing tree habit (eastern white pine), aspect of trunk, cones; identifying selected plant and animal species; choosing a subject matter for accomplishing with students of grammar school, gymnasium and lyceum in the field in respect of: biotope, diversity and

unity of thallophytes, diversity and unity of telomophytes ecology and environment protection, eucaryote, primary stages of chordates development, selected problems concerning ethology (Fleszar, 2005).

Stop (point) II: pedunculate oak Quercus robur L.

Amphibians living in this area and in the nearest surrounding are: tree-frog *Hyla arborea L.*, grey toad *Bufo bufo L*., spotted newt *Triturus vulgaris L.*, which occur especially in May (pairing season). From among birds one may run across: wood warbler *Phylloscopus sibilatrix Bechts*., black-headed whitethroat *Sylvia atricapilla (L.)*, European nuthatch *Sitta europaea L.*, garden tree creeper *Certhia brachydactyla C.L. Brehm*. and chaffinch *Fringilla coelebs L.*

Activities of students are: acquainting with field class programme, e.g. concerning phenology; observing terrestial biotope (ecosystem); observing tree habit (pedunculate oak), aspect of trunk; identifying selected plant and animal species;choosing a subject matter for accomplishing with students of grammar school, gymnasium and lyceum in the field in respect of: biotope, diversity and unity of thallophytes, diversity of invertebrates, diversity of chordates, diversity of telomophytes; ecology and environment protection, eucaryota, primary stages of chordates development, selected problems concerning ethology (Fleszar, 2005).

Stop (point) III: the Goplana lake (enchantlingly situated, with rush vegetation by its waterside)

. Sandy beaches allow access to the water. Here one could find out: brittle willow *Salix fragilis L.,* European larch *Larix decidua Mill*.; among shrubs: European elder *Sambucus nigra L.,* hedge rose *Rosa canina L*., wrinkled rose *Rosa rugosa Thunb*. Amphibians, that are met here, are: edible frog *Rana esculenta L*., grass frog *Rana temporaria L*., marsh frog *Rana arvalis Nill.,* spotted newt *Triturus vulgaris L*. A large number of animals is

encountered in particular in pairing season. Out of birds one may notice and see European cuckoo *Cuculus canorus L.,* chaffinch *Fringilla coelebs L.,* blackbird *Turdus merula L*. and coming to the water mute swan *Cygnus olor (Gmel*.), coot *Fulica atra L*., mallard duck *Anas platyrhyncha L.*

Activities ofstudents are: acquainting with the method of accomplishing ecological contents; observing aquatic biotope (ecosystem); characteristics of plant complexes and animal groups within the lake; choosing a subject matter for accomplishing with students of grammar school, gymnasium and lyceum in the field in respect of: biotope,diversity and unity of thallophytes, diversity of invertebrates, diversity of chordates, diversity of telomophytes, ecology and environment protection, eucaryota, primary stages of chordates development, selected problems concerning ethology (Fleszar 2005).

Stop (point) IV: the Głuszec lake (here one could observe):

Purple European beech *Fagus silvatica L.,* Norway spruce *Picea excelsa (Lom.),* Scotch pine *Pinus silvestris L.,* pedunculate oak *Quercus robur L*., European larch *Larix decidua Mill*. Amphibians, that may be met here, are: edible frog *Rana esculenta L*., marsh frog *Rana arvalis Nill*., grass frog *Rana temporaria L.,* fire-bellied toad *Bombina bombina L*. Large concentration of these animals occur in springtime during pairing season. Out of birds live here: wood warbler *Phylloscopus sibilatrix (Bechst*.), blackbird *Turdus merula L*., European robin *Erithacus rubecula (L.),* blue tit *Parus caeruleus L*., song thrush *Turdus philomelos (C.L. Brehm.),* chaffinch *Fringilla coelebs L*., brown willow warbler *Phylloscopus collibita (Vieill.),* European wren *Trogladytes trogladytes (L.).*

Activities of students are: observing aquatic biotope (ecosystem); characteristics of plant complexes and animal groups within the lake; choosing a subject matter for accomplishing with students of grammar school, gymnasium and lyceum in the field in respect of: aquatic biotope, diversity and

unity of thallophytes, diversity of invertebrates, diversity of chordates, ecology and environment protection, eucaryota, primary stages of chordates development, selected problems concerning ethology (Fleszar, 2005).

Stop (point) V: the "Uroczysk"

One sees here rich and diverse vegetation - from among trees: Scotch pine *Pinus silvestris L*., drooping birch *Betula verrucosa Ehrh*., Norway spruce *Picea excelsa (Lom.),* brittle willow *Salix fragilis L*., pedunculate oak *Quercus robur L.*; from among shrubs: filbert *Corylus avellana L*., snowberry *Symphoricarpus albus (L.),* rowan *Sorbus aucuparia L.* Out of invertebrates we encounter here snails: amber snail *Succinea putrius L.*, white-lipped grove snail *Cepaea hortensis Mül*l. and brown-lipped snail *Cepaea nemoralis L*. Out of insects one may find ants Monomorium in fenced knolls. Birds, which are to be found in this area and in the surrounding, are: turtle-dove *Streptopelia turtur (L.),* black redstart *Phoenicurus achruros (Gmel*.), pied wagtail *Motacilla alba L*., European cuckoo *Cuculus canorus L.,* blue tit *Parus careruleus L.*, wood pigeon *Columba palumbus L*. To the water comes for feeding: mute swan *Cygnus olor (Gmel*.), mallard duck *Anas platyrhyncha L.* and coot *Fulica atra L.*. Amphibians, which live here, are: grey toad *Bufo bufo L*., tree-frog *Hyla arborea L.,* spotted newt *Triturus vulgaris L*., grass frog *Rana temporaria L.,* edible frog *Rana esculenta L*., and sometimes marsh frog *Rana arvalis Nill*. Large concentration of these animals occur in pairing season Fleszar (2005).

Activities of students are: observing aquatic biotope (ecosystem); characteristics of plant complexes and animal groups within the lake; choosing a subject matter for accomplishing with students of grammar school, gymnasium and lyceum in the field in respect of: biotope, diversity and unity of thallophytes, diversity of invertebrates, diversity and unity of thallophytes, diversity of chordates, ecology and environment protection, eucaryota, primary stages of chordates development, selected problems concerning ethology

Fleszar (1996, 2005); acquainting with field class synopsis; writing field class synopsis according to given instructions.

During the classes of biology didactics and environment protection the students work out field classes synopses for selected lesson units at different teaching levels. Field classes are usually more difficult to carry on for teachers than lessons in school workroom. Preparation to field classes contains many organisational works that concern the conducting person and the participants. Teacher, prior to the date of these classes, has to check carefully in the area whether the scheduled theme may be accomplished there and then inform and prepare school students to that type of classes. School students should obtain readable (clear) instructions in writing, referring to field work, and a list of references related to class theme (Fleszar,1997).

Exemplary synopsis of biology filed classes for accomplishing in the field is presented in the Appendix.

During the classes a special students' attention has been called by the method of teaching in the field classes. This method is field observation. Observation, as one of the active methods in biology teaching, enables school students to understand the world in its unity and complexity, develops in them the ability to learn by themselves, inspires them to investigative work and to express their own opinions and experiences. School students participate very wilingly in field classes and are active during them. This activity manifests itself in greater creativity, i.e. in that that school students perceive and see the world with their all senses. When observing, they can touch, see, and feel; by reason of that all these feelings influence their ability to memorize and understand knowledge. The knowledge acquirred during field work should be used in typical and problem situations. Field classes develop in school students an attitude to factual contents of natural character, external world and self-bieng (Mikołajczak-Półtorak & Gwardys, 2002).

Ecology and environment-oriented education is understood as increasing the ecological awareness that leads to acquirring ecological culture.

Ecological awareness consists of: ecological learning, ecological imagination and ecological ethics. Ecological learning contains the knowledge and competencies referring to the processes that occur in natural environment covering ecosystems and the knowledge on mechanisms of their equilibrium as well as the relationships between forms of human activity in natural environment referring to environment pollutants and hazards and preventive treatment methods. Ecological imagination is the competence and the ability to forsee ecological effects of human activities as well as to notice connections between processes occurrung in environment and civilisation development. This all manifests itself in the ability to plan ecologically safe activities (Fleszar, 2002, 2004)

Ecological ethics is the ability to act in accordance with standards accepted in a given time and era. The acquirred ecological culture comprises: elements of environment protection;

natural methods of preserving the health, with special attention paid to psychophysical equilibrium, harmonious functioning of the man in environment and susceptibility to stress; living consistent with the nature in external and internal harmony (Fleszar, 1995,1998).

Table 1. *Results of the research carried out on students of biology in the Department of Natural Sciences at University of Szczecin in the course of compulsoryPracticum in Didactics of Biology*

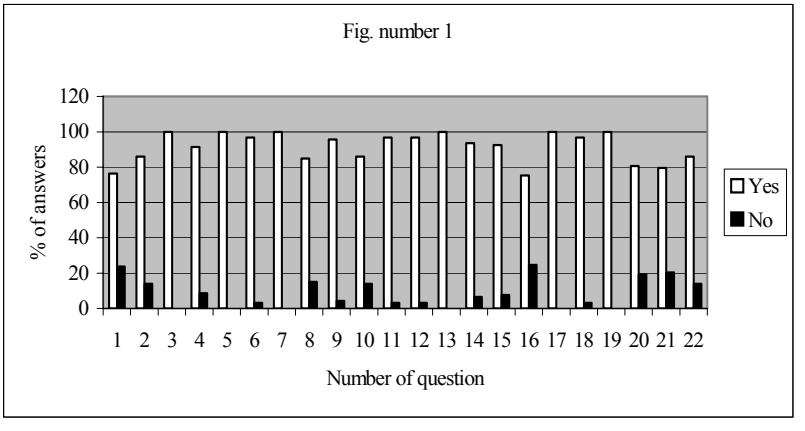
Question number	Ans.	2004 (93)		2005 (101)		2006 (104)		Total (298)	
		Nu	%	Nu	%	Nu	%	Nu	%
1.Field classes develop the habit of exact and systematic work	Y	71	76,34	93	92,08	94	90,38	258	86,58
	N	22	23,66	8	7,92	10	9,62	40	13,42
2. Field classes develop the responsibility for results and effects of work	Y	80	86,02	92	91,09	94	90,38	266	89,26
	N	13	13,98	9	8,91	10	9,62	32	10,74
3. Field classes develop a proper attitude to work	Y	93	100	100	99,01	99	95,19	292	97,99
	N	-	-	1	0,99	5	4,81	6	2,01
4. Field classes develop the competence of planning and organization	Y	85	91,40	90	89,11	98	94,23	273	91,61
	N	8	8,60	11	10,89	6	5,77	25	8,39
5. Field work develops the habit of team work	Y	93	100	101	100	104	100	298	100
	N	-	-	-	-	-	-	-	-
6. A field visit develops aesthetical sensibility	Y	90	96,77	95	94,06	100	96,15	285	95,64
	N	3	3,23	6	5,94	4	3,85	13	4,36
7. Field work increases emotional connection with nature	Y	93	100	100	99,01	101	97,12	294	98,66
	N	-	-	1	0,99	3	2,88	4	1,34
8. Field work helps in understanding the principles and postulates of nature preservation and environmental protection	Y	79	84,95	85	84,16	97	93,27	261	87,58
	N	14	15,05	16	15,84	7	6,73	37	12,42
9. Team work helps to discover talents and interests	Y	89	95,70	90	89,11	91	87,50	270	90,60
	N	4	4,30	11	10,89	13	12,50	28	9,40
10. Field classes develop perceptiveness	Y	80	86,02	92	91,09	93	89,42	265	88,93
	N	13	13,98	9	8,91	11	10,58	33	11,07
11 Field classes influence the forma-	Y	90	96,77	98	97,03	94	90,38	282	94,63

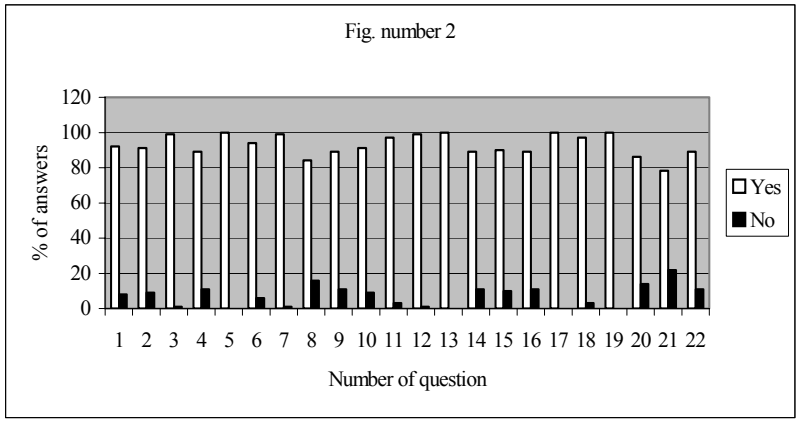
tion of observation skills: - phenological, - ethological, - ecological	N	3	3,23	3	2,97	10	9,62	16	5,37
12. Field classes develop the skill of recognizing plants and animals	Y	90	96,77	100	99,01	98	94,23	288	96,64
	N	3	3,23	1	0,99	6	5,77	10	3,36
13. Field classes enable to teach practical use of theoretical knowledge	Y	93	100	101	100	104	100	298	100
	N	-	-	-	-	-	-	-	-
14. Field classes permit to perceive the dependence of organisms from their habitat	Y	87	93,55	90	89,11	94	90,38	281	94,30
		6	6,45	11	10,89	10	9,62	17	5,70
15. I know and I understand the notion of sustainable development (eco-development)	Y	86	92,47	91	90,10	94	90,38	271	90,94
	N	7	7,53	10	9,90	10	9,62	27	9,06
16. I know what the strategy of sustainable development concerns	Y	70	75,27	90	89,11	92	88,46	252	84,56
	N	23	24,73	11	10,89	12	11,54	46	15,44
17. I know what phenology deals with and to what purpose	Y	93	100	101	100	104	100	298	100
	N	-	-	-	-		-	-	-
18. I understand the notion of biodiversity, that is biological variety	Y	90	96,77	98	97,03	100	96,15	288	96,64
	N	3	3,23	3	2,97	4	3,85	10	3,36
19. I know what Agenda -21 speaks of	Y	93	100	101	100	104	100	298	100
	N	-	-	-	-	-	-	-	-
20. Field classes allow to cover the material concerning environmental protection	Y	75	80,65	87	86,14	90	86,54	252	84,56
	N	18	19,35	14	13,86	14	13,46	46	15,44
21. I know what tasks were undertaken of the Earth Summit in Johannesburg	Y	74	79,57	79	78,22	85	81,73	238	79,87
	N	19	20,43	22	21,78	19	18,27	60	20,13
22. Field classes are more attractive than those taking place in a laboratory	Y	80	86,02	90	89,11	100	96,15	270	90,60
	N	13	13,98	11	10,89	4	3,85	28	9,40

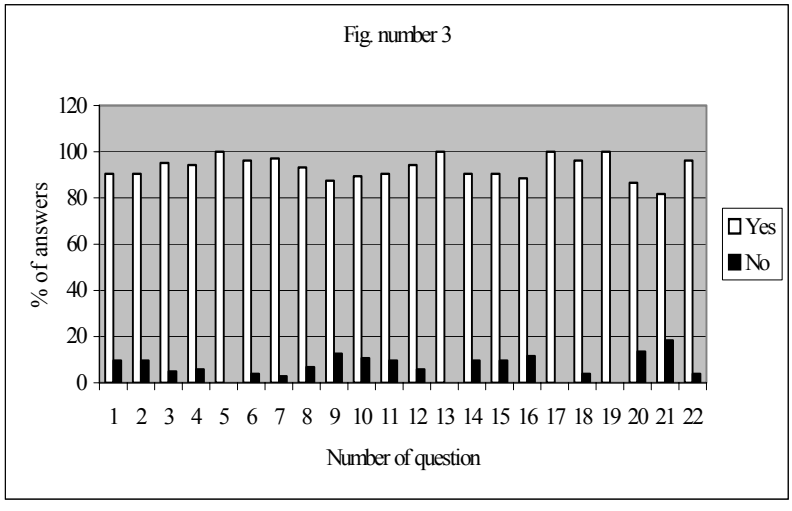
Fleszar (2007): ANS. – answers, Y – yes, N – no, Nu – Number of answers, % - per cent of answers

The research conducted shows that students value the part of field classes "they develop the habit of exact and systematic work (question 1- 86,58 %), "they develop the responsibility for results and effects of work (question 2- 89,26 %), "they increase emotional connection with nature (question 7- 98,66 %), "they help in the understanding of principles and postulates of nature preservation and environmental protection" (question 8-87,56 %), "they influence the formation of ecological observation skills (phenological, ethological)" (question 11-94,63 %), "they understand the notion of sustainable development (eco-development) (question 15 - 90.94 %) as well as the strategy of sustainable development (what it concerns) (question 16-84,56 %) they understand the notion of biodiversity, that is biological variety" (question 18-96,64 %). They know what Agenda 21 speaks of (question 19-100) and what tasks were undertaken at the Earth Summit in Johannesburg (question 21- 79,87 %) (Fleszar (2005a).

Fig. number 1







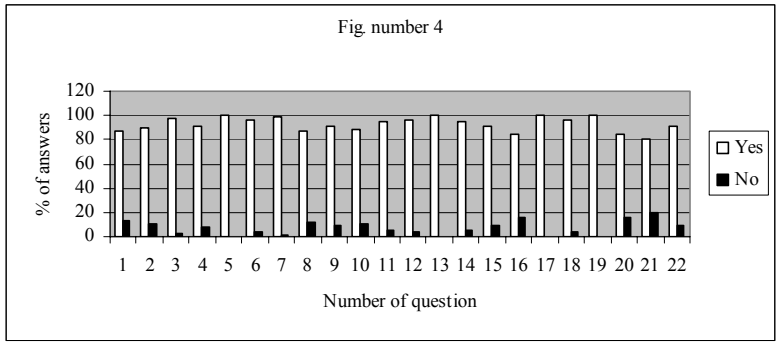


Fig. 1-4 (cf. Table 1 – 2004, 2005, 2006, 2004-2006, respectively

During field classes which take place on natural didactic path the role of teacher is to show students, the prospective teachers of biology and environment protection, the method of accomplishing assumptions of ecology and environment-oriented education. Undoubtedly, these classes may inspire them to further work.

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APPENDIX: FIELD CLASS SYNOPSIS (Gymnasium Grade 1)

Theme*:* "Introducing to aquatic co
mplex plants".
Lesson objectives:
Knowledge:
- understanding the following concepts: natural community, artificial community,
aquatic community,
- understanding the names of selected species of herbaceous plants, shrubs, trees
living in the community,
- understanding living conditions prevailing in the water,
- understanding plant adaptations to biotope.

Acquirements:
- co-operation witinh the group,
- planning of observations,
- making remarks from observations,
- identifying common plant species,
- noticing stratigraphic arrangement of aquatic vegetation,
- showing plant adaptation to biotope,
- formulating conclusions from observations,
- making use of illustrated guides and plant atlases and of apparatuses.

Attitudes:
- manners and discipline during the excursion,
- respect for rare species of native flora,
- implementation of team-work principles,
- development of investigative attitude.

Strategy: P (problem).
Form of classes: field classes.

Method: field observations.
Didactic means: atlases and guides for plant identification, note-books and ball pens, thermometers, litmus papers.
Duration: 2 hours.
Season: spring.
Place: Natural Didactic Path in the Arkoñski Woods, the Wkrzañska Forest (Stops 3, 4, 5) (according to the conducting personås choice).
Preparation of field classes:

- careful examination of the field work area by the teacher,
- preparation of teachers to field work in terms of material and methods.

References:

- atlases and guides for plant identification.

Preparation of school students to field work by the teacher:

- information on excursion date and site,
- stating a theme of classes,
- instructing school students of class obejctives and duration,
- settling on equipment and clothing,
- stating a list of references.

Course of field classes:

- meeting at school in fixed time,
- checking the attendance list, clothing and equipment,;
- departure to field classes,
- partition into 5-6 person groups,
- distribution of equipment and instructions to groups.

Work themes for particular groups:
Group I, Group II
Work up plants of coastal zone of the lake according to given instructions (choose 5 species for observation).
Group III, Group IV
Work up plants of underwater zone of the lake according to given instructions (choose 5 species for observation).
Work instructions for respective groups:

1. Give names of plant species encountered here. Use atlases and guides.
2. Determine living conditions prevailing in the water - describe them:
   - water temperature,
   - water pH,
   - clarity of water reservoir,
   - amount of coming up light,
   - water reservoir pollution.

3. Make a sketch of the external structure of selected plants, mark respective respective
organs.
4. Notice adaptations of the said plants to living in particular zone, describe them.
5. Groups start working (field observation), staying within the eyeshot of teacher.

Work summing up:

-checking the attendance list,
-verbal report from works of particular group,
-instruction to well-order the notes and prepare to discussion in class-room lesson,
-teachers evaluation of field work and discipline of groups during field work,
-home work - elaboration of written reports by particular groups.

During class-room lesson, each group presents their written report from field classes.
Making a note by teacher in a note-book of school student according to instructions.

THE SCHOOL GARDENS IN PRESERVING BIOLOGICAL DIVERSITY FOR EDUCATION OF SUSTAINABLE DEVELOPMENT

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Abstract. In the teaching-learning process, a school garden allows to fully cover the contents of biology and environment protection curricular basic requirements. The role and importance of school gardens increased immediately after WW II but later the idea of these school structures waned. However, today we come back to the creation of school gardens and incorporating them in the educational process. A school garden fulfils a great didactic and tutorial function. At the same time, it allows to connect theory with practice. It enables teachers to conduct classes in the open air in "a green classroom". Didactic literature quotes that the use of school gardens in teaching and learning of biology increases the effectiveness of the educational process. The analysis of reports of students of IV Biology at the Natural Sciences Department of Szczecin University, who have conducted classes in a school Botanical Garden of Primary School No. 61 in Szczecin, shows the huge role of a school garden in the teaching-learning process. The students conclude that a school garden

gives them an opportunity for direct contact with nature. The garden develops pupils' talents and interests and teaches them to conduct ecological and phonological observations.

Keywords: school garden, plants, animals, phenology

Introduction

Collecting plants of various species is as old as human civilization. In the Ancient Times plants were grown for cultural and aesthetic reasons. In China the art of gardening was closely linked with the development of Buddhism (Buddhist temples were surrounded by beautiful, colourful gardens). In Egypt (in Thebes) one of the most famous construction of the Ancient World was created, the so called Queen Hatchepsut's gardens (it was a temple devoted to god Ra surrounded by a beautiful garden). In III BC, also in Egypt, another magnificent garden was started by the Greeks in Alexandria. Gardens as a symbol of power and kings' riches were created also in many other countries, e.g., in Turkey.

The first garden of scientific and didactic importance was a botanic garden which was located next to Aristotle Lyceum in a forest park in Athens. In the middle ages there were no proper conditions for creation of gardens. In the Renaissance a new type of garden appeared – a garden of collector-didactic profile. It was connected with the great geographic discoveries and the import of exotic plants to Europe at a grand scale. In the years of 1534 – 1621 gardens in Pisa, Florence and Oxford were started. The most turbulent period of gathering and collecting of plants is linked with the growth of the British Empire, e.g., Royal Botanical Garden in Richmond near London (Węglarski, 1997).

The Botanic Garden of Jagiellonian University in Krakow is the oldest one in Poland. It was founded in 1783 but the first idea of establishing a garden at Krakow Academy emerged as early as 1602, when the founder of the

first chair of medicinal botany in Krakow, Jan Zemełka, allotted a part of funds for the establishment of the garden. The botanic garden in Wrocław was set up in 1811 as an integral part of a newly founded University of Wrocław. The assumed date of the establishment of the Botanical Garden at the University of Warsaw is the year of 1818 when the garden existing at the Medical School since 1811 was moved to the area located within the-so-called Royal Garden, including the upper part of Łazienki. At that time the University of Warsaw took over the care of the garden (Teske, 1997).

Currently botanic gardens are dynamically developing all over the world and actively joining in the fight for the protection of the natural environment. In the era of total destruction of the plant world the creation of botanic gardens and arboretums constitutes a measure of civilization progress of societies (Węglarski, 1997).

The fundamental objectives of botanical gardens are: collecting plant material for scientific and didactic purposes, participation in the global programme of protecting vanishing, endangered and rare species as well as the dissemination of botanic knowledge, including the idea of environment protection (Teske, 1997).

A botanic garden is a living book and it constitutes a source of spontaneous motivation for and development of students' attitudes to nature. It facilitates teachers in covering material at various levels of teaching. Classes planned in a botanic garden, apart from their cognitive values, help young people to realize the global character of the environment, to acquire knowledge about the environment and problems related to it, to shape pro-ecological attitudes, to acquire the competence in identifying and solving environmental problems and they enable active participation in solving of environmental problems (Drapikowska, 1997)

The use of botanic gardens in teaching of biology at school can be done in various ways. It may be running field classes for a big group, but pupils are going to find classes in smaller groups much more beneficial because there

they can actively participate. It would be advisable to use guidebooks, folders and descriptions with regard to particular chapters and plants. A pupil who directly takes part in searching in a given guidebook or plan for plants, remembers them much better than in the case of his/her passive participation in classes (Dobrzycka, 1997).

Botanic gardens create great opportunities of educating a society. The sections set up in a garden (e.g., systematic, ecological, geographical, biological, variability and genetics of plants, crop plants, protected plants, decorative plants) enable to study the subjects of taxonomy, morphology, physiology, geography, ecology, genetics, pharmacy, environment protection, etc. Botanic gardens are of inestimable scientific and didactic value. They teach about the local and foreign flora, they stress the curiosities in the fields of biology, morphology, genetics, they familiarize with lowland, highland and mountain vegetation, the flora of lakes, peat, meadows, dunes, steppes, etc. Knowledge of plants can offer numerous benefits, and it is not limited only to the pleasure of watching beautiful flowers or the consumption of tasty fruit, but it makes one realize that one's existence is dependent upon nature (Więcław, 1997).

Content

The term school garden is understood as a patch of green land around a school (or area located in the vicinity of a school), typically surrounded by a fence or a hedge, which was planted with a variety of plants (orchard plants, decorative plants, vegetables, etc.) and used for animal breeding, equipped with various tools used for farming and animal husbandry. A school garden serves most importantly for conducting certain type of didactic and tutorial classes in a given school (Sawiński, 1991). The basic functions of school gardens include the following activities: tutorial; didactic; recreational; cultural; protective of the elements of biodiversity outside their natural habitat. A school garden works as a biology and environment laboratory. It influences: (a) the shaping of a co-host attitude, getting used to thorough and systematic

work for the school development of responsibility for results of one's actions; (b) appropriate attitude of a pupil to work, development of work planning and organisation, putting the pupils into a habit of team work; (c) development of aesthetic sensibility; (d) deepening of emotional link with nature; (e) understanding of rules and demands of nature conservation and environment protection. Classes conducted in a school garden help in revealing talents and biological interests and their development. They develop perceptiveness and abilities to: (i) conduct phenological, ecological observations and observations relating to nature conservation; (ii) recognise and mark plants and animals; (iii) use theoretical knowledge to solve practical problems; (iv) see dependence of an organism on the environment. Work in a school garden helps to familiarize pupils with: (1) working and fertilising the soil, growing and cultivation of plants; (2) gardening tools; (3) cultivated plants and weeds, their structure and biology; (4) protected plants; (5) plants of various adaptations (Stawiński, 2000).

Due to ever increasing environmental pollution, urbanisation, industrialisation and climatic changes that are associated with them, the danger to the environment has been growing dramatically in recent years. We mean here the danger to existing biological biodiversity, that is, in essence, to the entire variability of living organisms and ecological complexes linked with them. The term encompasses 3 levels of nature organisation: ecosystems, species and genotypes (populations).

In 1992 the United Nations Organization held an international conference in Rio de Janeiro (UNCED), called the Earth Summit, which was devoted to develop effective methods of protecting biodiversity with due consideration to the use of its elements and fair division of profit resulting from the exploitation of the so called genetic resources. The most important document of this conference was the Convention on Biological Diversity. The Parliament of the Republic of Poland ratified the Convention on Biological Diversity in 1996. The content of the Convention is of great importance to the development of

botanical gardens action programmes. The provisions of the Convention oblige the governments which were parties to the Convention to support the actions relating to the protection of biodiversity. The actions relate to the protection of elements of biodiversity outside their natural habitat. It is a complementing alternative to species and genotypes protection (Puchalski, 1997).

The threat to plant species in the world is very big. It is estimated that among approximately 260 thousand species of vascular plants appearing on the globe, as many as 60 thousand species are in danger of extinction within the nearest 20-30 years. It is estimated that on average one plant species dies out every day. The most endangered plants live in the tropical climate; it especially concerns the species occurring in humid tropical forests (Puchalski, 1997).

To maintain biodiversity it is necessary to develop forms and perfect methods of ecological-environmental education. National strategy for the protection of species' biological diversity assumes the engagement of greater proportion of the society into the issues and actions for environment protection (Fleszar, 2005).

School Botanical Garden in Szczecin has a variety of flora: trees, bushes and green plants. Plantings appear within the area of the garden, around the school and in front of the entrance. One can find here, among others: saucer magnolia (*Magnolia soulangeana*), common lilac (*Syringa vulgaris*), broad-leaved lime (*Tilia platyphyllos*), false acacia (*Robinia pseudoacacia*), siberian spruce (*Picea Obovata*), spruce (*Picea*) trailing variety, Austrian pine (*Pinus nigra*), dwarf mountain pine (*Pinus mugo*), common yew (*Taxus boccata*), sycamore (*Acer pseudoplatanus*), common juniper (*Juniperus communis*), pea fruited cypress (*Chamaecyparis pisifera*), common laburnum (*Laburnum anagroides*), almond tree (*Prunus amygdalus*), japan quince (*Chaenomeles japonica*), rhododendron (*Rhododendron*), common broom (*Sarothamnus scoparius*), weeping forsythia (*Forsythia suspensa*), sweet mock orange (*Philadelphus coronaries*), Lady's fingers (*Hibiscus esculentus*), snowstorm spiraea (*Spraea media*), holly mahonia (*Mahonia aquifolium*), Weigela Florida

(*Weigela florida*), common box (*Buxus sempervirens*), bigleaf hydrangea (*Hydrangea macrophylla*), clematis (*Clematis*), common honeysuckle (*Lonicera periclymenum*), Adam's needle (*Yucca filamentosa*), peony (*Peonia*), irises (Iris), forget-me-not (*Myosotis*), lily of the valley (*Convallaria maialis*), purple fox-glove (*Digitalis purpurea*), columbine (*Aquilegia vulgaris*), heartsease (*Viola tricolor*), peppermint (*Mentha piperita*), water plantain (*Alisma plantago-aquatica*) (in a small pond).

According to Kowalski's research (1989), schools founded before 1969 had a managed didactic garden, because it resulted form administrative obligation of utilising gardens in the teaching of biology (in the decades of the 1950s and 1960s). However, in a great majority of these schools the gardens have been closed down in recent years. Schools founded after the year 1970 have not had any school gardens. The most common reason being: lack of space to set up a garden; insufficient financial resources for the purchase of materials and tools, appropriate area for the set up of a school garden neighbouring the school has been destined for teacher's allotments. In a few cases lack of motivation to run a garden has been quoted. Classes in the garden are conducive to a better understanding of biology curriculum contents; they encourage better remembrance of the contents (Kowalski, 1989). According to Majecka & Nowak (1981) classes in the garden encourage adolescents to start thinking independently; they develop interests in agro-biology. During such classes pupils acquire skills and abilities to apply them in life. A school garden maintained in this manner fulfils a huge role in keeping biodiversity in the full sense of the word (Fleszar, 2005; Fleszar & Gwardys-Szczęsna, 2005).

Method

The method employed for the research was reports' analysis of students of IV Biology at the Natural Sciences Department of Szczecin University. The abovementioned tasks fulfilled by a school garden are confirmed by pupils'

reports from the School Botanical Garden at Primary School No. 61 in Szczecin.

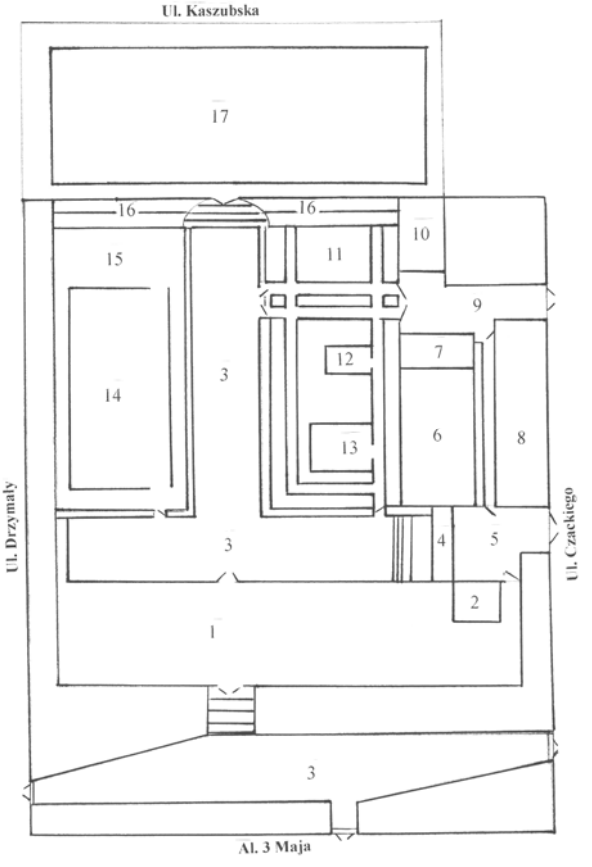

Fig. 1 Garden layout (1- school building; 2- garden workshop; 3- paving; 4- passage; 5-farmyard; 6- gym building; 7- teacher's flat; 8- orchard; 9- entrance gate; 10- garage; 11- vegetable experimental allotment; 12- garden pond; 13- garden classroom; 14- green gym; 15- rose garden; 16- Japanese terraces; 17- football pitch (ice rink in winter)

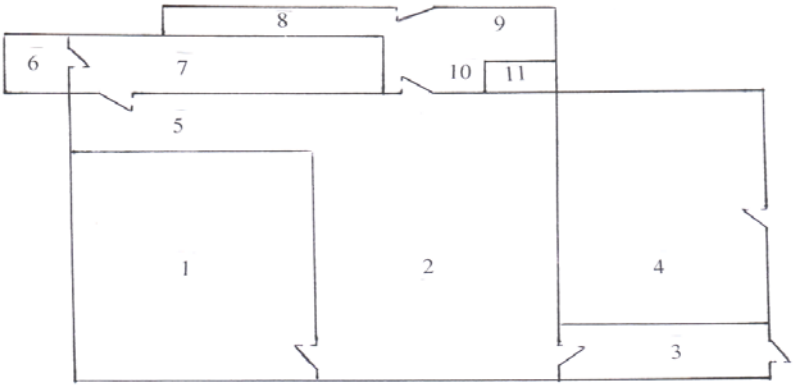

Fig. 2. Layout of garden workshop containing in school building (1- bright room with windows; 2- dark room, drying room; 3- vestibule I; 4- laundry; 5- small laboratory; 6- cold basement; 7- technical equipment, tool room; 8- big tools; 9 – vestibule II; 10- cloak room; 11- chimney [*cold room – basement*: a storeroom for keeping garden plants wintering in law temperatures in the basement, seeds, bulbs, rootstocks; small garden tools; crop protection chemicals, fertilizers; paints, solvent; small gardening accessories; *bright room with windows:* garden and pot plants' reproduction; storeroom for plant pots, vases and ikebanas; colorful photos – plant classification; classes with children adequate to the room function; *dark room – drying room:* storeroom for drying and storing plants for dry arrangements; exhibition room for plant display; classes with children adequate to the room function; *small laboratory:* plant preparation in higher temperatures strengthening colors in glycerine for dry arrangements, carried out on a gas stove; soil roasting in high temperature in order to decontaminate it from spores of fungal diseases, bacteria and removing seed from weeds (so prepared soil is used to grow healthy seedling of plants from seeds sowed in window boxes); accessories, containers for flower arrangements; sink; *vestibule I:* storeroom for dried plants; drying room for dry flower arrangements; *vestibule II:* tools for direct work in the soil – big rakes, spades, forks, hoes, etc.; garden hose; window boxes, buckets and other gardening containers; grinders for sharpening garden tools; cloakroom for a gardener – hangers, shelves and closets; *laundry:* washing a dirty clothes after gardening; washing, shower after gardening; washing of school personnel's clothes].

Results

Table 1. The results after the analysis of the stay of Szczecin University students in the School Botanical Garden

Contents analyzed	Y	2003 /24/		2004 /31/		2005 /83/		Total /138/	
	N	No of ans.	% ans.	No of ans.	% ans.	No of ans.	% ans.	No of ans.	% ans.
1. A school garden instills in pupils a habit of thorough and systematic work	Y	23	95,83	27	87,1	63	75,90	113	81,88
	N	1	4,17	4	12,9	20	24,10	25	18,12
2. A school garden develops responsibility for results of actions	Y	22	91,67	25	80,65	43	51,81	90	65,22
	N	2	8,33	6	19,35	40	48,19	48	34,78
3. A school garden develops a proper attitude to work	Y	20	83,33	23	74,19	16	19,28	59	42,75
	N	4	16,67	8	25,81	67	80,72	79	57,25
4. A school garden develops abilities of planning and organization	Y	15	62,5	25	80,65	40	48,19	80	57,97
	N	9	37,5	6	19,35	43	51,81	58	42,03
5. A school garden develops a habit of team work in pupils	Y	21	87,5	25	80,65	59	71,08	105	76,09
	N	3	12,5	6	19,35	24	28,92	33	23,91
6. A school garden develops aesthetic sensibility	Y	16	66,67	23	74,19	57	68,67	96	69,57
	N	8	33,33	8	25,81	26	31,33	42	30,43
7. A school garden helps to deepen an emotional link with nature	Y	13	54,17	19	61,29	48	57,83	80	57,97
	N	11	45,83	12	38,71	35	42,17	58	42,03
8. A school garden helps to un-	Y	20	83,33	28	90,32	79	95,18	127	92,03

derstand the rules and demands of nature conservation and environment protection	N	4	16,67	3	9,68	4	4,82	11	7,97
9. A school garden helps to reveal pupils' talents and interests	Y	18	75	22	70,97	67	80,72	107	77,54
	N	6	25	9	29,03	16	19,28	31	22,46
10. A school garden develops pupils' perceptiveness	Y	19	79,17	23	74,19	44	53,01	86	62,32
	N	5	20,83	8	25,81	39	46,99	52	37,68
11. Classes conducted in school garden help to develop phonological and ecological observation skills	Y	20	83,33	23	74,19	44	53,01	87	63,04
	N	4	16,67	8	25,81	39	46,99	51	36,96
12. Classes conducted in a school garden help in learning the recognition of plants and animals	Y	18	75	24	77,42	42	50,60	84	60,87
	N	6	25	7	22,58	41	49,40	54	39,13
13. Classes conducted in a school garden teach to apply theoretical knowledge in practice	Y	24	100	29	93,55	56	67,47	80	57,97
	N	-	-	2	6,45	27	32,53	58	42,03
14. Classes conducted in a school garden allow pupils to see the dependence of an organism on the environment	Y	18	75	25	80,64	66	79,52	109	78,99
	N	6	25	6	19,35	17	20,48	29	21,01
15. Classes conducted in a school garden familiarize pupils with the growing , fertilization and tending of plants	Y	18	75	21	67,74	60	72,29	99	71,74
	N	6	25	10	32,56	23	27,71	39	28,26
16. Classes conducted in a school	Y	20	83,33	21	67,74	63	75,90	104	75,36

garden familiarize pupils with garden tools	N	4	16,67	10	32,26	20	24,10	34	24,64
17. A school garden allows to cover the botany contents of the curriculum	Y	19	79,17	23	74,19	46	55,42	88	63,77
	N	5	20,83	8	25,81	37	44,58	50	36,23
18. A school garden allows to cover the zoology contents of the curriculum	Y	14	58,33	14	45,16	73	87,96	101	73,19
	N	10	41,67	17	54,84	10	12,04	37	26,81
19. A school garden allows to cover the ecology contents of the curriculum	Y	14	58,33	16	51,61	51	61,45	81	58,70
	N	10	41,67	15	48,39	32	38,55	57	41,30
20. A school garden allows to cover the environment contents of the curriculum.	Y	21	87,5	27	87,10	58	69,88	106	76,81
	N	3	12,5	4	12,90	25	30,12	32	23,19
21. A school garden allows to conduct a class in the open air, in the so called "green classroom"	Y	15	62,5	18	58,06	61	73,49	94	68,12
	N	9	37,5	13	41,94	22	26,51	44	31,88
22. Classes conducted in a school garden are more attractive to pupils than those in a school classroom	Y	15	62,5	17	54,84	73	87,96	105	76,09
	N	9	37,5	14	45,16	10	12,04	33	23,91

Abbreviations: Y – students mention this role / task / fulfilled by a school garden in the report; N – students do not mention this role / task / fulfilled by a school garden in the report; No of ans. – number of answers; % of ans. – per cent of answers

The research conducted shows that students value the role and importance of school garden. A school garden instills in pupils a habit of thorough and systematic work (the question 1 – 81,88%), develops responsibility for results of actions (the question 2 – 65,22%), develops a habit of team work in

pupils (the question 5 – 76,09%), develops aesthetic sensibility (the question 6 – 69,57%), helps to understand the rules and demands of nature conservation and environment protection (the question 8 – 92,03%) and helps to reveal pupils' talents and interests (the question 9 – 77,54%). Classes conducted in school garden help to develop phonological and ecological observation skills (the question 11 – 63,04%), allow pupils to see the dependence of an organism on the environment (the question 14 – 78,99%), familiarize pupils with the growing, fertilization and tending of plants (the question 15 – 71,74%) and familiarize pupils with garden tools (the question 16 – 75,36%). A school garden allows to cover the botany contents of the curriculum (the question 17 – 63,77%), allows to cover the zoology contents of the curriculum (the question 18 – 73,19%), allows to cover the ecology contents of the curriculum (the question 19 – 58,70%) and allows to cover the environment contents of the curriculum (the question 20 – 76,81%). Classes conducted in a school garden are more attractive to pupils than those in a school classroom (the question 22 – 76,09%).

Discussion

The analysis of reports of students of IV Biology at the Natural Sciences Department of Szczecin University, who have conducted classes in a school Botanical Garden of Primary School No. 61 in Szczecin, shows the huge role of a school garden in the teaching-learning process. The students conclude that a school garden: (1) gives them an opportunity for direct contact with nature; (2) develops their talents and interests; (3) teaches them to conduct ecological and phonological observations, teaches to recognize plants and animals, helps them to acquaint knowledge about growing, fertilizing and tending of plants.

To sum up, a school garden should constitute a part of a biology classroom in every school since in this way we ensure maintaining of biodiversity. Teachers ought to apply the principle created by Professor Bolesław

Hryniewiecki – a long-standing director of the Botanic Garden in Warsaw – "when learning about the plant world, we ought to study plants foremost, and not the books on plants" (Teske, 1997).

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APPENDIX. Graphical presentation of the results shown in Table 1: Diagrams 1-4 (2003, 2004, 2005, 2003-2005, respectively)

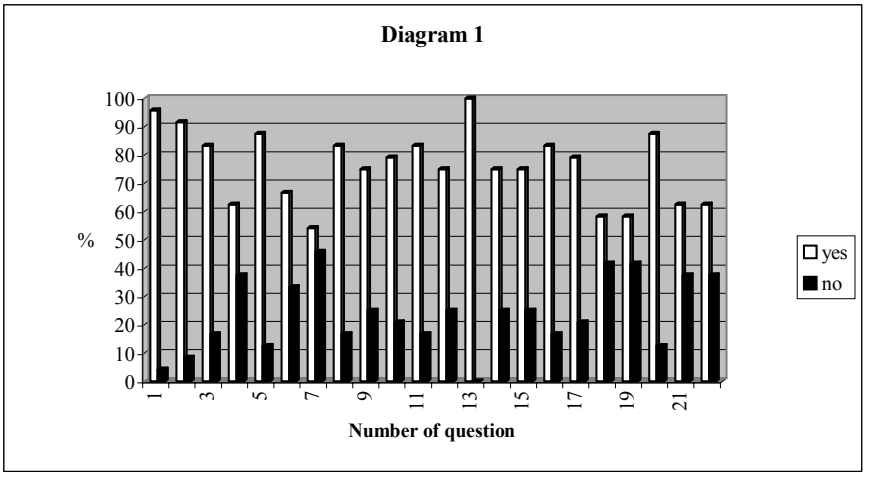


Diagram 2.

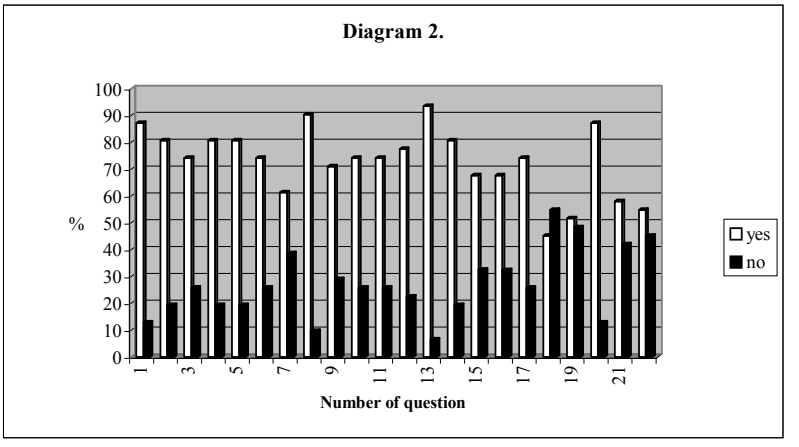


Diagram 3.

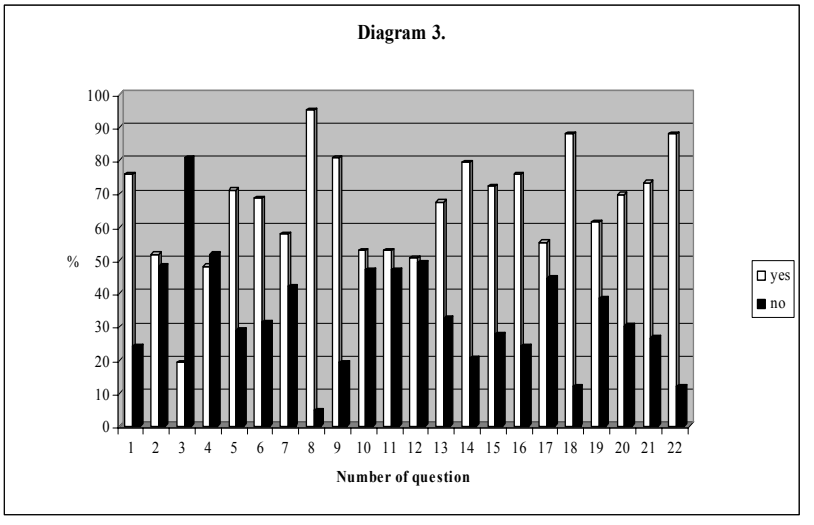
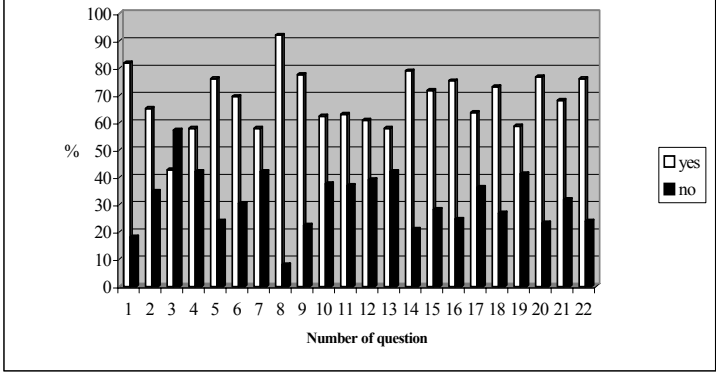


Diagram 4.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Number of question
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CONSTRUCTIVIST PRACTICES THROUGH GUIDED DISCOVERY APPROACH: THE EFFECT ON STUDENTS' COGNITIVE ACHIEVEMENTS IN NIGERIAN SENIOR SECONDARY SCHOOL PHYSICS

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Abstract. The study investigated constructivist practices through guided discovery approach and the effect on students' cognitive achievement in Nigerian senior secondary school Physics. The study adopted pretest-posttest control group design. A criterion sampling technique was used to select six schools out of nine schools that met the criteria. A total of 278 students took part in the study; this was made up of 141 male students and 137 female students in their respective intact classes. Physic Achievement Test (PAT) with the internal consistency of 0.77 using Kuder-Richardson formula (21) was the instrument used in collecting data. The data were analyzed using Analysis of Covariance (ANCOVA) and t-test. The results showed that guided discovery approaches was the most effective in facilitating students'

achievement in physics after being taught using a pictorial organizer. This was followed by demonstration while expository was found to be the least effective. Also, there exists no significant difference in the achievement of male and female physics students taught with guided discovery, demonstration and expository teaching approaches and corresponding exposure to a pictorial organizer. It is recommended that physics teachers should endeavor to use constructivist practices through guided discovery approach in order to engage students in problem solving activities, independent learning, critical thinking and understanding, and creative learning, rather than in rote learning and memorization.

Keywords: constructivism, guided discovery, students' cognitive achievement, Physics

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Introduction

The challenge in teaching is to create experiences that involve the student and support his own thinking explanation, evaluation, communication and application of the scientific models needed to make sense of these experiences. Hence, constructivism is a theory that suggests that learners construct knowledge out of their experiences which is associated with pedagogical approaches that promote learning by doing or active learning (Afolabi & Akinbobola, 2009). Constructivist teaching focuses on independent learning, creativity, critical thinking and problem solving. Constructivist teaching is based on the fact that skills and knowledge acquisition are not by passive receiving of information and rote learning but involve active participation of the learners through knowledge construction, hands-on and minds-on activities (Akinbobola & Ado, 2007).

Teacher roles in constructivist teaching is to serve as facilitator of learning in which students are encouraged to be responsible, autonomous and

construct their own understanding of each of the scientific concept. Hence, the activities are learner-centered, democratic and interactive. In constructivist classroom, the teacher facilitates and provides students with experiences that allow them to use the science process skills such as observing, measuring, classifying, communicating, inferring, using number, using space/time relationship, questioning, controlling and manipulating variable, hypothesizing, defining operationally, formulating models, designing experiment and interpreting data.

According to Inyang (1993), activity based science teaching allows students to explore their environment and discover nature. As such, a lot of inquiry prevails in the classroom, with the teacher acting as a motivator, getting from point-to-point to guide the learning of students and help them overcome difficulties. The teachers perform the role of a resource person who guides the learners to sources of information.

Nwagbo (1999) explains that in the guided discovery mode which is an example of constructivist learning is an approach to enquiry. On the other hand, the teacher provides illustrative materials for students to study on their own. Leading questions are then asked by the teacher to enable students think and provide conclusion through the adoption of the processes of sciences. Nwagbo believes that if the learner is allowed to discover relationships and methods of solution by him make his own generalizations and draw conclusions from them, he may then better prepared to make wider applications of the material learned. According to Ugwuanyi (1998), a learner is active in discovery leaning, and provides for individual differences as well as makes the process of learning to be self-sequenced, goal directed, with the goal perceived and the pace self-determined.

Demonstration is a teaching approach that links explanation with practice. Berkey (1975) explains that a good demonstration exercise helps students to understand the lesson very clearly, since they combine the senses of sight,

hearing and touching while learning. That is, it is a technique of teaching concepts, principles or real things by combining oral explanation with the handling or manipulation of real things. According to Urevbu (1990), demonstration is an approach of instruction which combines presentation and investigation. The purpose behind this approach of instruction may be outlined as follows: i) Apparatus is introduced to the student in such a way that he is able to understand its uses and limitations; ii) The student is encouraged to adopt by imitating the correct methods of use of the apparatus; iii) Time is saved and the number of teaching staff required to provide individual laboratory instruction is reduced; iv) The student is shown experiments which because of the danger, cost or complexity involved, he could not perform in the laboratory.

Expository teaching merely emphasizes presenting ideas and information meaningfully and effectively so that the learner can derive other meanings from what he is presented with. Expository teaching is sometimes called deductive teaching because the teacher often begins with a definition of the concepts or principles illustrate them and unfolds their implications. Factual information is most easily learned if it is organized and sequenced logically. Hence, the contents of material must be presented in a logical order, moving from generic to specific concepts, so that learners can form cognitive structures and encode new information. The expository approach is a teacher-centered, student-peripheral teaching approach in which the teacher delivers a pre-planned lesson to the students with or without the use of instructional materials.

Gbamanja (1991) observes that in using this approach, the teacher talks about science while the students read about science. However, the modern expository approach involves more than talking and reading about science, for it allows some interaction between the teacher and the students in terms of asking and being asked questions on the topic of discussion.

A pictorial organizer is a visual and graphic display that depicts the relationships between facts terms and /or ideas within a learning task. Pictorial organizer is a form of an advance organizer and is also sometimes referred to as knowledge maps, concepts maps, cognitive organizers or concept diagrams. According to Mayer (2003), the effects of advance organizers should be most visible for test that involve creative problem solving, because the advance organizer allows the learner to organize the material into a familiar structure. New information about a concept is filled into an existing framework of categories called "Schemes" that contain specific information about a concept. So, when prior knowledge is retrieved this schema provides a framework on which to attach new knowledge. If no previous knowledge is available, advance organizers are used to give knowledge to the students in order for this framework to be followed and new information retained for recall and transfer (Bromley et al., 1995).

Statement of the problem

For more than a decade now, the different instructional strategies employed in teaching physics have not improved students' achievement in the subject to any appreciable extent. This mean that the most desire scientific and technological application of physics cannot be sustained. The implication is that the teaching of physics does not lead to students' understanding of concepts, functionality and application of its ideas. Hence, the need is to find pedagogic approaches that promote active learning. What will be the effect of teaching approaches (guided discovery, demonstration and expository) on students' cognitive achievement in Physics?

Purpose of the study

The study is designed to achieve the following specific objectives: (1) to investigate the effect of teaching approaches (guided discovery, demon-

stration and expository) on students' cognitive achievement in physics after being taught using a pictorial organizer; (2) to determine the effect of gender (Male and Female) on students' cognitive achievement in physics after being taught with (i) guided discovery (ii) demonstration (iii) expository teaching approaches and corresponding exposure to a pictorial organizer.

Research hypotheses

The following null hypotheses were formulated and tested at .05 level of significance: (a) there is no significant effect of teaching approaches (guided discovery, demonstration and expository) on students' cognitive achievement in Physics after being taught using a pictorial organizer; (b) there is no significant effect of gender (male and female) on students' cognitive achievement in physics taught with (i) guided discovery (ii) demonstration (iii) expository approaches and corresponding exposure to a pictorial organizer.

Research method

The research design adopted for this study was a non-randomize pre-test-posttest control group. The population for the study was made up of all the senior secondary two (SS2) physics students in the 12 co-educational secondary schools in Ife Central Local Government Area of Osun State. The size of the population was 852 senior secondary two (SS2) physics students. A total of 278 students took part in the study; this was made of 141 male students and 137 female students. Purposive sampling technique was used to select schools from the target population. The criteria are: 1) Schools that have well equipped and functional physics laboratories; 2) Schools that are currently presenting candidates for the Senior Secondary School certificate Examination (SSSCE) and have at least one professional graduate physics teacher with at

least three years of teaching experience; 3) School in which the concept of heat energy transfer has not been taught already.

Nine schools met the above criteria six schools among those that met the criteria were selected by balloting. The schools were randomly assigned to treatment and control groups. One intact class was randomly selected in each school.

The researchers made instrument, physics Achievement Test (Pat) comprised of 50- multiple choice items in the concept of heat energy transfer was used in collecting the data for the study. Each items had four option with only on e correct answer and the correct answer was score 2marks. The Pat was validated by two physics education and their comment and corrections were incorporate into the final form of the instrument. The difficulty and discrimination indices of PAT items were 0.62 and 0.52 respectively. The PAT trial tested with 40 subjects who were not parts of the main study but who were found to be equivalent in all respects to the students used for the study. A reliability coefficient of 0.77 was obtained using Kuder-Richardson formula (21).

The pictorial organizer package was developed by the researcher and consisted of various charts, pictures and maps related to the concept of energy in term of forms of energy, source of energy, conversions of energy and application of energy conversion, which served as subsumer for the learning of heat transfer.

The variables of teacher quality were controlled by using research assistants who were the physics teachers in each school to teach each group. Detailed instructions with lesson plan on the concept of heat energy transfer were given to the researcher assistants during the training that was conducted for them in one week. Pre-test was administered to both the experimental and control groups and the results were used as covariate measures in order to take care of possible initial differences in groups. Two days after the administra-

tion of the pretest, pictorial organizer was introduced to the two groups (experimental and control groups) for 1hr 20 minutes (double period) in each class by the research assistants.

The teaching of the concept, heat energy transfer was done by the research assistants in each school from a well-articulated lesson package developed by the researcher for six (6) weeks. The lesson packages prepared by the researcher were used in order to standardize the concept that was taught by research assistants. The experimental group 1 was taught using guided discovery while the experimental group 2 was taught using demonstration. The control group was taught using expository teaching method. Immediate after the teaching of the concept of heat energy transfer, posttest was administered to the experimental and control group. The data obtained were analysis using t-test and analysis of covariance. All the hypotheses were tested at .05 level of significance.

Research procedure

The pictorial organizer was initially introduced to all the groups before treatment. This is to present students with context and conceptual frameworks that help students to arrange, integrate and retain material, other than specify content and detail. If no previous knowledge is available, the pictorial organizer will provide a frame work on which to attach knowledge. Learning is interactive, building on what the students already know. The experimental group I was taught with guided discovery. Using this approach, the teacher provides illustrative materials for students to study on their own. Leading questions are then asked by the teacher to enable students think and provide conclusion through the adoption of the processes of science. The teachers guide the students and help them to construct their own knowledge. The experimental group 2 was taught demonstration. In this approach, the teacher alerts the class of the purpose of the demonstration and explains the step-by step operations

that will be involved. Thereafter, he carefully carries out the demonstration and describes every step and action while students watch. The students are encouraged to adopt by imitation of the correct methods of the use of the apparatus. The experimental group 3 (control group) was taught with expository. In this approach, the teacher involves in the selection, organization and translation of subject-matter in a developmentally appropriate manner. The teaching is deductive because the teacher often begins with a definition of the concepts or principles, illustrates them and unfolds their implications. The contents of material are presented in a logical order, moving from generic to specific concepts.

Results

Table 1. *Descriptive of pretest, posttest and the mean gain scores*

Gender	Teaching Approaches	N	Pretest scores		Posttest scores		
			$\bar{X}$	S.D	$\bar{X}$	S.D	Mean Gain Score
Male	Guided Discovery	47	29.23	7.51	77.87	9.13	48.64
	Demonstration	49	28.74	7.92	69.80	10.40	41.06
	Expository	45	28.18	7.54	60.00	7.30	31.82
Total		141	28.72	7.62	69.36	11.57	40.64
Female	Guided Discovery	47	29.87	7.53	77.58	9.02	47.71
	Demonstration	44	29.82	7.32	68.64	10.10	38.82
	Expository	46	28.17	6.89	59.57	8.07	31.40
Total		137	29.29	7.24	68.66	11.70	39.37

As shown in Table 1, it was observed that the mean gain scores of male and female students taught with guided discovery were greater than the mean gain scores of male and female students taught with demonstration which in turn were greater than the mean gain score of male and female students taught with

expository after being exposed to a pictorial organizer. It was however observed that the mean gain score of male students (40.64) was greater than the mean gain score of female students (39.37)

Hypothesis Testing

Hypothesis One

There is no significant effect of teaching approaches (guided discovery, demonstration and expository) on students' cognitive achievement in physics after using a pictorial organizer.

The analysis is as shown in Table 2

Table 2. *One way Analysis of Covariance (ANCOVA) of post test scores of students taught with guided discovery, demonstration and expository using pretest scores as covariates*

Source of Variation	Sum of Squares	Df	Mean Square	F-cal	F-critical	Decision at p<.05
Pretest	18328.76	1	18328.76	775.44	3.89	*
Main effect	12560.77	2	6280.38	265.71	3.04	*
Explained	30889.53	3	10296.51	435.62	2.65	*
Residual	6476.42	274	23.64			
Total	37365.94	277	134.90			

* =Significant at p<.05 alpha level

Table 2 shows that the teaching approaches main effect was significant at p<.05. The calculated F-value of 265.71 is greater than the critical F-value of 3.04. Therefore, the null hypothesis stating a non-significant effect of teaching approaches (guided discovery demonstration and expository) on students' achievement in physics after being taught using a pictorial organizer was rejected. This implies that the three types of teaching approaches (guided discovery, demonstration and expository) differ significantly in their enhancement of the achievement of physics students after being taught using a pictorial organizer. Consequent upon the observed difference in the teaching

approaches, Multiple Classification Analysis (MCA) was considered to determine the index of relationship and also to determine the variance of the dependent variable (achievement) in physics that is attributable to the influence of the independent variable (teaching approaches) as shown in Table 3.

Table 3. *Multiple Classification Analysis (MCA) of the posttest scores of students taught with guide discovery, demonstration and expository teaching approaches*

Grand Mean =69.01	N	Unadjusted		Adjusted for Independent variable and covariates	
Variable + Category		Dev'n	Eta	Dev'n	Beta
Teaching approaches			0.63		0.58
Guided Discovery	94	8.71		8.14	
Demonstration	93	0.23		-0.02	
Expository	91	-9.23		-8.39	
Multiple R.=0.91					
Multiple R. Squared =0.83					

As shown from Table 3, the teaching approaches (guided discovery, demonstration and expository) have an index of relationship of 0.34 (0.58^2), hence the observed relationship in favor of teaching approaches, shows that the teaching approaches have a significant relationship 0.34 (Beta value of (0.58^2) with achievement of students in physics. Table 3 also shows a multiple regression index (R) of 0.91 with a multiple regression squared index (R^2) of 0.83. This implies that 83% of the total variance in the achievement of students in physics is attributable to the influence of teaching approaches after being exposed to a pictorial organizer.

To find the direction of significance under investigation, the posttest scores were subjected to Scheffe Multiple Comparison test for a post hoc analysis as shown in Table 4.

Table 4. Result of Scheffe's post hoc test for multiple comparisons of teaching approaches on students' achievement in physics

Dependent Variables: POST TEST SCORES						
(1) Teaching approaches	(J)Teaching approaches	Mean difference (I-J)	Std. error	Sig.	95% confidence lower bound	Interval upper bound
GDY	DEM	8.48*	1.322	.000	5.22	11.73
	EXP	17.94*	1.330	.000	14.67	21.22
DEM	GDY	-8.48*	1.322	.000	-11.73	-5.22
	EXP	9.47*	1.333	.000	6.19	12.75
EXP	GDY	-17.94*	1.330	.000	-21.22	-14.67
	DEM	-9.47*	1.333	.000	14.67	21.22

*The mean difference is significant at the .05 level; GDY=Guided discovery; DEM=Demonstration; EXP= Expository.

As shown in Table 4, the mean difference between GDY and DEM was 8.48, between GDY and EXP was 17.94, and between DEM and EXP was 9.47. This implies that guided discovery is the most effective in facilitating students' achievement in Physics after being exposed to a pictorial organizer. This is followed by demonstration while expository is seen to be the least effective in facilitating students' achievement in physics after being exposed to a pictorial organizer.

Hypothesis Two

There is no significant effect of gender (male and female) on students' achievement in physics taught with (i) guided discovery (ii) demonstration (iii) expository teaching approaches and corresponding exposure to a pictorial organizer. The analysis is as shown in Table 5.

Table 5. t-test comparison of posttest mean scores of male and female students taught with guided discovery

Gender	N	$\overline{X}$	S.D.	DF	t-cal.	t-critical	Decision at p<.05
Male	47	77.87	9.13	0.16	92	1.98	NS
Female	47	77.57	9.02				

NS = Not significant at P<.05 alpha level

The analysis in Table 5, shows that the calculated t-value of 0.16 is less than the critical t-value of 1.98 at P<.05. Therefore, the null hypothesis stating a non significant effect of gender (male and female) on students' achievement in physics taught with guided discovery and corresponding exposure to a pictorial organizer was retained. This implies that gender does not significantly influence students' achievement in physics when the students are taught with guided discovery and corresponding exposure to a pictorial organizer.

Table 6. t-test comparison of posttest mean scores of male and female students taught with demonstration

Gender	N	$\overline{X}$	S.D.	DF	t-cal.	t-critical	Decision at p<.05
Male	49	69.80	10.40	91	0.55	1.98	N.S
Female	44	68.64	10.10	8			

NS = Not significant at p<.05 alpha level

The analysis in Table 6, shows that the calcualated t-value of 0.55 is less than the critical t-value of 1.98 at p<.05. Therefore, the null hypothesis stating a non significant effect of gender (male and female) on students' achievement in physics taught with demonstration and corresponding exposure to a pictorial organizer was retained. This implies that gender does not significantly influence students' achievement in physics when the students are

taught with demonstration and corresponding exposure to a pictorial organizer. The analysis is as shown in Table 7

Table 7. t-test comparison of achievement mean scores of male and female students taught with expository

Gender	N	$\overline{X}$	S.D.	DF	t-cal.	t-critical	Decision at p<.05
Male	45	60.00	7.30	89	0.27	1.98	N.S
Female	46	59.57	8.07	8			

NS = Not significant at P<.05 alpha level

The analysis in Table 7 shows that the calculated t-value of 0.27 is less than the critical t-value of 1.98 at P<.05. Therefore, the null hypothesis stating a non significant effect of gender (male and female) on students' achievement in physics taught with expository and corresponding exposure to a pictorial organizer was retained. This implies that gender does not significantly influence students' achievement in physics when the students are taught with expository and corresponding exposure to a pictorial organizer.

Discussion of results

The result of hypothesis one as shown in Table 2 indicated that a significant difference was found to exist in the achievement of students in physics taught with guided discovery, demonstration and expository after being exposed to a pictorial organizer. Multiple Classification Analysis (MCA) as shown in Table 3 indicated that 83 % of the total variance in the achievement of students in physics is attributed to the influence of teaching approaches after being exposed to pictorial organizer. The Scheffe's post hoc analysis as shown in Table 4 indicated that guided discovery was the most effective in facilitating students' achievement in Physics after being exposed to a pictorial organizer. This was followed by demonstration while expository was seen to be the least effective.

The findings might be due to the stability and clarity of the anchoring ideas that the pictorial organizer provided in the cognitive structure of the physics students and it seemed to make students to remember more conceptual ideals and was able to relate the test to prior knowledge. The findings tally with the results of Onwioduokit & Akinbobola (2005) that a pictorial organizer is one of the most effective in facilitating students' achievement and retention of materials taught in physics among different types of advance organizers. Also, the constructivist view of learning point towards a numbers of different teaching practices. It usually means encouraging students to use active techniques (guided discovery and demonstration) to create more knowledge and then to reflect on and talk about what they are doing and how their understanding is changing. The teacher makes sure he understands the students' preexisting conceptions (through pictorial organizer), and guides the activity to address them and then build on them.

Constructivist teaching is based on the facts that learning occurs as learners are actively involved in a process of meaningful and knowledge construction rather than passively receiving information. Learners are the makers of their own learning. Hence, it fosters independent learning, creative thinking and motivates learning. This research study supports those of earlier studies of Bundrick (1968), Kersh (1998), Omwirhiren (2002), and Akinbobola (2006) that the guided discovery approach was effective in enhancing the achievement and retention of students in science subjects. This finding might be due to the fact that guided discovery has the benefit of increasing intellectual potency by enhancing the learner's ability to organize and classify information. Information imbibed through guided discovery becomes firmly embedded in the cognitive structure of the learner thereby facilitating retrieval.

The study is in agreement with position of Onyejiaku (1987) who opined that in the learning process involving reacting, doing and experiencing

such as demonstration, information is better registered because the hearer sees the instructor demonstration strategy over expository strategy.

The results of the investigation as shown in Tables 5-7 indicated an insignificant effect existing between the achievement of male and female physics students taught with guided discovery, demonstration and expository teaching approaches and corresponding exposure to a pictorial organizer. This may be so because any good teaching approach adopted in the teaching of physics does not discriminate between the sexes. Also, applying appropriate teaching approaches. Also, applying appropriate teaching approaches can help both male and female students learn and remember facts, apply skill, comprehend concepts, analyze and synthesize principles which are cognitive objective for physics education. Also, the enthusiasm exhibited by both male and female students who showed equal zeal when they were taught using a pictorial organizer may have led to equal performance at given tasks. This might be due to the fact that both male and female students interact with each other freely in groups and have led to increasing the depth of understanding, enhancing motivation, developing positive attitude toward later use of material presented in the course, develop problem solving skills and generating greater involvement of both male and female students with the concept.

The result is also consistent with the findings of Leinhardt et al. (1979), Akinbobola (2006), Akinbobola (2008) and Afolabi & Akinbobola (2009) that show no significance difference in the mean performance between boys and girls in the manipulation of the same instructional materials as well as in their rate of contribution and class participation. He noted that every child, both male and female must be given the opportunity to display his/her manipulate ability as fully as possible, be he quick or slow, deep or superficial in thinking, once they are taught with the same teaching approach. This is because a good performance of student depends on his interest as well as the techniques used by the teacher and the types of instructional materials in-

volved, in that two students taught under different conditions normally perform differently.

Conclusion and implications

A pictorial organizer enhances students' achievement in physics. Guided discovery is the most effective in facilitating students' achievement in physics after being taught using a pictorial organizer. This is followed by demonstration while expository is found to be the least effective. Also, there exists no significant difference in the achievement of male and female physics students taught with guided discovery, demonstration and expository teaching approaches and corresponding exposure to a pictorial organizer.

The findings of this investigation have implications for improvement of science and technology in Nigeria. The guided discovery approach has been found in this study to be the most effective in the achievement of students in physics. Therefore, the sustenance of students' interest in science and technology can be achieved by the adoption of the guided discovery approach of instruction which, if well planned, can encourage and motivate the student to practice and apply the scientific knowledge gained to new situation by making use of the process skills of science. This could lead to the acquisition and development of technology in the country. Through self-discovery, students will be able to develop more positive attitude towards learning skills and also, it will enhance learning outcomes through hands-on and minds-on activities.

Recommendations

Based on the results of the study, the following recommendations were made: (1) Physics teachers should endeavor to use constructivist practices through guided discovery approach in order to engage students in thinking understanding and creative learning, rather than on rote learning and memorization; (2) Federal, State and Local Government should upgrade the infra-

structures and equip laboratories in order for the students to be actively involved in their learning; (3) Physics teachers should always improvise simple basic laboratory material for effective use in hands-on strategies, in the absence of standard laboratory materials; (4) Physics students should be engaged in laboratory activities for meaningful acquisition of scientific knowledge, processes and ethics; (5) Physics teachers should make all their lessons problem-oriented, because students always show interest when they are faced with a puzzle; (6) Curriculum planners for senior secondary school physics should as a matter of priority incorporate pictorial organizer in curriculum development and physics teachers should explore the use of pictorial organizers in teaching various concepts at senior secondary school level.

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EDUCATION ON TOLERANCE DEVELOPMENT: A CASE STUDY

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Abstract. The article presents the most important results of a study, based on a concrete practice - an international project, titled "Teaching Tolerance". This project has been carried out by partner institutions from Germany, Bulgaria, Turkey and some other countries as a part of the biggest European Community "Lifelong Learning (LLL) Programme". The project ended successfully in 2008 but the LLL program is providing wide facilities for development of future teaching tolerance projects. From this aspect, the experience which was conducted will be beneficial for universities, schools, and other educational and cultural organizations which can develop projects or participate as partners in them.

Keywords: tolerance, teaching tolerance, intercultural education, international partnership, Lifelong Learning Programme

Introduction

Cultivation of the tolerance through educating and training is a contemporary and universal requirement and necessity with its widest

understanding. The fulfillment of this need is also an actual priority for the educational systems in European Union in which participate different nations, languages and cultures. The European community is required to improve this specific kind of education of people from different ages with the acceptance of values and norms of a new culture of tolerance. The updated Lisbon strategy of EU[1)] refers to especially the social cohesion and directs to the systematic and contiguous policy in this direction, to acceptance of common European dimensions and values, including also the culture of tolerance. Therefore, important role will play the education of people from all ages – i.e., lifelong learning. In accordance with this concrete precautions are undertaken. Not coincidentally, lifelong learning is already the biggest active educational program in Europe. The program could be the important instrument to resolve the current and significant problems of society and education, incl. via education and training on tolerance.[2)]

Development of education on tolerance through projects by Lifelong Learning Program is a problem with theoretical and practical aspects which are still not researched and worked out in necessary level. The report concerns some of these aspects presenting the results of the conducted research on the problem. The research is based on a concrete practice - an international partnership project, titled "Teaching Tolerance" from the Lifelong Learning Programme. This project has been carried out by partner institutions from Germany, Bulgaria, Turkey and some other countries and ended successfully in 2008. It provided the authors with good facilities for observation, inquiry researches, analysis of documents, practices and results, as well as derivation and summarizing conclusions and recommendations, concerns with development of teaching tolerance through possible future projects.

The purpose of the study was to shed light on the opportunities for development of training on tolerance by means of affiliated projects in accordance with the Lifelong Learning Programme.

The authors determined the following main tasks in accordance with the set goal: (i) to study the fundamental nature of education on tolerance in the context of the intercultural education and the lifelong learning; (ii) to analyze and summarize the practical experience of the implemented educational and pedagogic activities in connection with the "Teaching Tolerance Project"; (iii) to formulate basic conclusions and recommendations for future projects and initiatives, as well as for subsequent studies on the problem. The set purpose and tasks were completely achieved and in the context of this report will be presented some of the major results related to the perspective development of the actual and essential problem of development of training on tolerance.

1. The Intercultural education as a lifelong learning process

Jean Monnet - regarded by many as a chief architect of the contemporary European unity, expressed the thought, that if this union had to be created now, he would start its construction with priority integration processes in the field of the education. The reasons are indisputable – the proper education serves as a powerful factor for the social-economic development and the employment, as well as for successful resolution of the problems of the civil society, the ecology, the social and cultural cohesion, etc. That is why the development of the education and more specifically - of the intercultural education - is amongst the priorities in the policy of the European Commission.

The intercultural education has many forms of appearance and various dimensions. Its variety of manifestation is reflected by the multitude of terms and definitions which attempt to embrace and express its essential characteristics - multicultural education, pluracultural education, transcultural education, etc. Usually, in connection with the expression of nature of the intercultural education, it represents education, which does not suppress the

cultural societies, allows them to maintain and extend their distinctive character, contributes for their successful integration, and is based on the common human values. There are some distinctions – for example: between multicultural (e.g., directed toward affirmation of the cultural pluralism) and intercultural (directed toward the dialogue, the mutual understanding, the respect toward the dissimilarities) education, training and upbringing.[3)]

In our opinion, the term „intercultural education" perfectly suits for designation of the phenomenon, whose essence is expressed by overcoming (by means of training and education to a wide extent) the limitations and achieving mutual social sensitivity, interactivity and synergy between different cultures. By its nature, the intercultural education represents also denial of opposite to its philosophy and still widely adopted (regrettably) policies and social practices of apartheid, segregation and assimilation. The central role in it plays the development of the tolerance as a form not only for parallel peaceful coexistence, but also for interaction of the cultures, serving as joint creators of the common future (Nomura, 2002).

Until mid-nineties of the last century, the European educational priority was given to improvements in the education of each new generation young people as well to measures for development of educational processes for the adults. The goal of the European Commission was to achieve an educational process (including intercultural aspects), which continues throughout the active, working period of life – by means of the so-called "permanent education" (for adults).

Since 1996, this goal was modified by the conducted campaign "European year of Lifelong Learning". The campaign made popular a new paradigm for development of the education during XXI century, while the European Commission, UNESCO, the organization for Economic Co-operation and Development (OECD) and other international organizations started active development of this new conceptual vision for the education.

Resulting from their activity was stimulated the implementation of reforms in the Member States and the countries – partners of the European Union, intended the development of pan-European Lifelong Learning Area.

Being a system for holistic, intercultural education, the Lifelong Learning shall comprise completely diverse educational processes which at present take place to certain extent in accordance with the individual capabilities, when and where this is necessary for the people and as much as the specific conditions of their life permit. However, these processes are still not organized in a complete frame, capable to provide purposefulness, continuity, sequencing and other attributes of consistency. Namely this, as well as complete transparency and equality of the formal, the non-formal and the informal education shall be provided by the system for Lifelong learning. (Катански, 2005).

It follows, that the new dimensions of the intercultural education are in connection with the formal, the non-formal and the informal learning in all domains of the human activity, which continues life long. Within its contemporary dimensions, the intercultural education creates opportunities for cultivation of the human capabilities and interactions between other people for the purpose of affirmation of the common human values. (Колева, 2007). Being holistic, intercultural education, the Lifelong Bearning is intended for humanization of the human interactions and the development of tolerance. (Nomura, 2002).

The development of Lifelong Learning requires specific actions as well – European programs, intended to direct the educational reforms to the proper direction. That is why, by virtue of Decision 1720/2006 of European Parliament from the beginning of 2007, the European Union introduced its newest educational programme „Lifelong Learning" with a budget, amounting to 6.970 billion EURO, which is opened for the 27 member states of the European Union, including Bulgaria, as well for Norway, Iceland,

Lichtenstein and Turkey. It replaced the existing programme „Socrates" in the form of a unifying framework of the already established programs „Comenius", „Erasmus", „Leonardo da Vinci" and "Grundwig", etc.

Near the end of 2006, the largest so far European educational programme was presented during special conference in Sofia. Being a new member of the European Union since 2007, January, 1st, Bulgaria joined to its application and extended the partnership participation in the European process for creation of the new education of XXI century – the Lifelong Learning. This partnership created new conditions and opportunities for development and intercultural education in the country, based on its new specific types, including education and training on tolerance.

2. The essential characteristics of training on tolerance

Our participation in the Lifelong Learning Programme with the project „Teaching Tolerance" was related to conducting intercultural education, so it had emphasized supra-national character. The educational activities, which we united for the purposes of the project, were developed in international and European scale, within the context of the globalization and the active cohesion policy of the European Union. In this respect, the implemented training in tolerance can be determined as a specific type of intercultural education, which possesses its own, still not completely studied, nature. Namely this was chosen by the authors of the report to serve as main subject of the study. Its clarification as early as during the preparatory phase of the project was important in light of the creation of a methodological vision for the organization and the implementation of the training.

The supposition of the authors, which was confirmed during the process of the study, was based on the notion, that in its essence "Teaching Tolerance", even in cases, when it is not related to educational establishments,

represents not only part of the inherent formal education, but also integrates within mainly informal and non-formal training activity.

In accordance with its essential characteristics, training on tolerance (carried out in accordance with projects in connection with the Lifelong Learning Programme), is of mixed type – both non-formal and informal. It is institutionalized to a certain extent, but at the same time, it is also not isolated (standalone), because it is carried out in the form of self-training within the process of other activities, though sometimes this is not even recognized. It is intended to satisfy the needs and the interests of the trainees, created and developed during the process of their activity in the different domains of life. "Teaching Tolerance" is not an isolated, organized and purposeful process. In the form of learning during the process of other activities (informal education), it allows additional development, enhancement and perfecting of the knowledge, the skills and the experience of the people, acquired by means of the formal and the non-formal training. In many cases, new knowledge is acquired, the preparation in different fields is enhanced and its practical implementation is facilitated (Katansky, 2008).

In spite of the fact that this specific project was intended for pupils, in practice in the training were involved people of different age, quite often they interchanged their places as trainees and tutors. In order to develop their own competence in the field of the tolerant thinking, attitude and action, these people had to acquire basic factual knowledge, to understand the facts and the ideas within the context of the conceptual framework, to organize their knowledge so that its retrieval is facilitated, in the form of skills for practical application in a close, as well in a context, which differs from their own experience. Substantially and methodologically, "Teaching tolerance" was organized around key notions and mastering of skills for the purpose of application in a concrete, close to the real life for successful integration in the multicultural environment. For the training organization and accomplishment

under the conditions of the project, the vision of the socio-constructivism, presented in its most synthesized form, the basic constructivist notions are as follows: (a) The learning, irrespectively of the domain, where it occurs and takes place (cognitive, affective, inter-personal or psycho-motor), includes process of individual transformation. The people learn by means of "embedding/integration" of the new knowledge into already existing cognitive structures (Honebein et al., 1993); (b) Knowledge and its meaning are not fixed in advance; they are rather constructed by the individual by means of his/her experience in a practical context. The learning and the context of the learning represent phenomena, which are in close mutual relationship (Brooks & Brooks, 1993). The learning represents "creation of own meaning". All of us derive meaning and relate this new experience to experience, which has been already acquired and reasoned. The social interactions serve not only as a supporting component, but also as an essential component in the cognitive development (Duffy & Cunningham, 1996); (c) The learning is always dialogic, irrespectively whether it is carried out directly (subject to subject), or indirectly – by means of a product, created by other subject. (Newman et al., 1989).

The above ideas and notions about the nature of the learning were embedded in the foundation of our vision for practical organization and implementation of the training. In accordance with it, the trainees are included in the situations of "Teaching Tolerance", based on their preliminary knowledge. The task of the instructors is to identify such knowledge and to support the process of augmentation of new experience. This represents a process, carried out by the trainees themselves, by means of implementing of variety of actions and interactions. The learning in the process of the activity shall gradually attain an autonomous character, upgrading to self-training, which possesses the attributes of the non-formal and the informal education.

The main idea during our efforts for the implementation of the Project can be formulated as development of versatile skill – the skill to learn how to live together, to be united in the diversity, to accept the dissimilarity, e.g. – to be tolerant. Analyzing and summarizing the experience after this project, we would like to stress, that namely the tolerance evolves into key social skill of XXI century, while "Teaching Tolerance" for the people of all ages is very essential component also in the system of lifelong learning.

3. Analysis of the project experience and results

The Project „Teaching Tolerance" was officially assessed by the authorized national agencies as one of the successful projects of the European "Lifelong Learning Programme". The Project was successful not only because it was organized and conducted in accordance with the criteria and the requirements of the programme,but also it had an innovative characteristic and created a model of good practice, which must be studied, popularized and disseminated.

An important aspect emerging from the experience of the project was the selection of adequate methods and means for achievement of the goal and the tasks. It was expected, that the implementation of the above project can bring successful answer to the main question: *How to teach and learn tolerance?* In order to resolve this question, the project stressed on the development of the creative potential of the pupils as well as on the innovations in the work of the instructors. Some leading models, which have proven pedagogic efficiency, were used in the global educational practice, such as: (1) *Project-based training* - The complete design of the project took into consideration this exceptionally reliable model for learning of content, with integrative character. Such projects require synthesis of notions and theories from different training disciplines, or assume application of knowledge in such disciplines in an integral practical context. The project

model of the training was connected with more long-lasting training activities, which also had more long-lasting results, while integrating the educational content with problems from the real life, thus providing strong motivation for the trainees, allowing them to follow their own interests and to demonstrate their abilities. The application of the model shifted the balance from the tutor to the pupil, thus qualitatively changing the traditional roles for the training in school. In the created by this model specific situation, the educational content was not offered in "prepared" by the tutor, and the pupils were working individually with the information, while discussing the problems and checking the truthfulness of their own knowledge, conclusions and hypotheses, creating joint strategies etc. In the process of work, developed were communicative and team work skills, which are very important for the contemporary life. At the same time, by means of successful team work during the implementation of the project, conditions were created also for drawing out of the individual contribution – depending of their knowledge, skills and capabilities, each of the participants contributed for achieving of the mission of the project; (2) *Collaborative and cooperative learning* – one of the contemporary models of training, based on solid theoretical foundations, resulting from enhanced practical studies. The main characteristics of this model are connected with clear feeling for positive interdependency and assistance, perceived personal responsibility in regard to the implementation of the group goals, continuous use of relevant skills, which are between persons and are typical for work in small teams, permanent recognition of the process of interaction from the group (reflection), with the purpose of improving of the teamwork efficiency. These characteristics of the model became apparent to full extent during the implementation of the project; (3) *Experiencial learning* - model with set of instructive, functional and organizational modifications. The learning, based also on the experience, can be defined as a process, where the trainee reflects on his/her own experience (cognitive, emotional, practical, experimental), and

based on this synthesizes new knowledge. The application of the model in the work on the project has stimulated the pupils to attain new knowledge based on their own experience, as well to apply them in new situations; (4) In accordance with the goals, the environmental conditions, the age and the experience of the participants and also other models of training and educational work were used. For example, in close relation to the collaborative and cooperative learning, used was the problem-solving method, which caused strong activation amongst the pupils. Also, brain-storming was used in connection with tasks, related to representation of the features of different societies and cultures, playing roles, etc. All these models were applied reasonably and in correspondence with the organization and the implementation of "Teaching Tolerance", which had motivating effect on the trainees, as well on the tutors.

The balanced diversity of models contributed for achievement of quality results as following: (i) "Teaching Tolerance" was integrated successfully in the system of school and out-of-school activities of all participants in the project - France, Germany, Poland, Turkey and Bulgaria. In this aspect, the efforts of the participating schools, of the tutors, of the trainees and their families must be noted too. The state and the local authorities also have played an important role, the same is valid for the mass media in all countries, which cooperated and supported the project, understanding the importance of these activities for the development of tolerance, interaction and cooperation of the multicultural and the mixed ethnical societies; (ii) The main team of 24 experts trained over 200 tutors in skills for work in multicultural environment. They used the new skills in out-of-school activities for "Teaching Tolerance", encompassing over 10 000 their pupils. Particular attention was devoted to work with pupils and their parents of Romany origin, as well with families in unfavorable position, in order to encourage their participation in education; (iii) especially for the purpose, club for pupils was

created, which had particular essential importance for the successful implementation of the project, leading to very good results. The trainees demonstrated strong desire to participate in this activity, which included explaining of the purpose of the project and its social mission, acquiring and dissemination (via website and using other channels) of additional information to all interested persons, conducting of thematic meetings with suitable official guests, charity activities for homes for elderly people, orphanages, etc.; (iv) Separate organized team investigated the national customs, the religious and the national holidays, collected suitable textual, photographic and other materials related to the tolerance, and based on the above, an artistically- created international calendar was prepared. This joint product was distributed to many schools on the territory of Bulgaria and in the remaining countries in accordance with the project, in this way they become aware of our work and some of them started their own activities in accordance with the training in tolerance; (v) The partnership appeared as a substantial factor for forming and the development of numerous and various knowledge, skills and competency, which is extremely important for the young people. In this context, we can mention the enriched knowledge about the cultures, the improved social skills and competence for training and the creative activity in a multicultural environment. By visits to various countries, the young people were involved in intercultural dialogues and practices of interaction between cultures, thus they attained self confidence and motivation for their further personal development; (vi) The project contributed for creation of interdisciplinary connections for teaching history, geography, literature, philosophy, psychology, artistic drawing, information technologies and English language.[4)] This connection between the different disciplines was useful for the tutors, who exchanged experience and knowledge, recognized the importance of all training disciplines in such context. As a whole, the participation in the project encouraged the tutors to perfect their skills and to

experiment, to seek and discover new opportunities for professional development.

4. Remarks on the tolerance questionnaires

The questionnaire on tolerance that was prepared during the study (see appendix) showed the differences of the students and their diversities. The students were introduced with the results at their own school as well as with the results of five partner schools which were presented in the project meeting. It was interesting when there were coincidences of the same ideas from different countries and cultures. The questionnaire showed that the pupils think optimistic for the future. The pupils who answered the questionnaire were from the age span of 12 to 17.

According to the results of the questionnaire on tolerance, 80-95 % of the students understand the tolerance as "accepting people as they are". Many of the students from Bulgaria and Poland believe that they live in intolerant society; on the other hand, the ones from France, Germany and Turkey believe that they live in a tolerant society. This conclusion can be drawn by analyzing the second graph where we can see the differences in these countries.

To the question "Do you think it is possible to have a close friendship with a person of a different religion?" most of the partners answered "Of course". The students from Turkey responded as "Yes, but not without difficulty". The same results can be seen in the responds to the question "Do you think it is possible to have a close friendship with a person of different culture?" This similarity shows that how related and close are the "religion" and "culture".

The answers to the question "What do you consider to be an obstacle to tolerance?" from Bulgarian students are "religion, culture, social statue and education", Polish students: "religion and culture", Turkish students: close results, but language and age are considered as low level obstacle, French

students: the highest level obstacle is education followed by religion and social statue.

The question “Do you believe that religion affects people’s tolerance?” is answered as “sometimes” by many of the children.

Most of the students responded to the seventh question as they believe that tolerance is acquired first in the street, than at school.

“Where would you like to see more tolerance?” – The top results are “in the street” and “at school”. 63% of German students pointed out that they want to see more tolerance also in their families.

In the final graph, 40 % of Bulgarian and Polish students think that tomorrow’s world will be “more tolerant”, 55 % of Turkish students think that it will be “less tolerant” where the other partners` results are less that 30%, about 35% of Bulgarian, Polish, French and German students believe that tomorrow’s world will be “the same”, whereas Turkish students` results are less than 20%.

These results show that many of the students think positive for the future. The different answers manifest the diversities of the ideas and thoughts of the students. Moreover, these results indicate that despite the differences, the students are ready to work, to study, to share in tolerance. They are ready to prevent possible problems and expect to see the tolerant atmosphere in all sectors of society.

5. Conclusions and comments

The conducted study on the problem for the development of “Teaching Tolerance”, based on use of projects in accordance with the European programme „Lifelong Learning”, has achieved its goals and tasks. The obtained results provide for the following more important conclusions and comments:

a) In its essence, “Teaching Tolerance” represents a specific didactical phenomenon, which even in the conditions of a school system features characteristics that are typical for the non-formal and the informal education. It represents training with inter-cultural character, which in practice is carried out during process of various activities within the entire range of the life, thus concerning all human ages. In this aspect, the contemporary “Teaching tolerance” must be considered as component of Lifelong learning, being connected to its goals and principles.

b) The conducted studies by means of questionnaires on the subject of the training – the tolerance, exhibited a nationally conditioned variety of the ideas and the thoughts of the trainees. Apart from this, these results have shown that in spite of the objectively existing differences in the notions regarding the tolerance of the representatives of different cultures, there is a common optimism about the future, as well an explicit desire of the questioned persons to be instructed in tolerance and to live under the conditions of shared tolerance.

c) During the process of the study it was proven that after the assumption, that the tolerance can be learned, it can be also successfully taught, including in training establishments. However, the experience after the project revealed, that it is necessary to use untraditional approaches and models of teaching and training. In addition to this, it is not necessary to introduce new standalone training discipline in the schools, the colleges and the universities. It seems far more rational to embody the training content in some suitable training disciplines, such as history, geography, ethics, language training and similar, as well in the system of out-of-class and out-of-school work. Under these conditions, “Teaching tolerance” shall not be related to offering of so-called “ready-made knowledge and skill“, but rather to the logistics and management of their standalone activity during acquiring of knowledge, skills and intercultural competency.

d) The role of the tutors for the successful implementation of international collective projects and achieving their goals has considerable importance. This role exceeds the merely instructing functions of the tutors, and includes moderation, logistics, and consultations during the standalone (individual or teamwork) work of the trainees, which is connected with manifestations of creative art, with various forms of art, culture, sport, etc. In order to perform successfully, the tutors must possess extensive basic skills, such as knowledge of foreign languages, mastering of the new information and communications technologies, skills for work in a team, they should be acquainted with the intercultural education, and they must possess personal qualities, in order to serve as positive example for the trainees.

e) Under the contemporary social and economic conditions, the development of "Teaching Tolerance" shall depend on the development and the accomplishment of successful projects, as well as the inclusion of more trainees and tutors in educational mobility and international partnership. The implemented project is an example for the wide opportunities for development of "Teaching Tolerance", embedded in the contemporary European programme «Lifelong learning». The success of the project and the existing considerable interest, not only in the member states, serve as an indication for the need for such projects, as well for enhancement of the educational dialogue between the cultures. Such projects should embrace more countries in the Balkans, following the lead of Bulgaria and Turkey. For this purpose, it is necessary to develop the administrative capacity of our educational establishments and our readiness for joint preparation and implementation of subsequent successful initiatives.

NOTES

1. http://ec.europa.eu/growthandjobs/index_en.htm

2. Two of the purposes of the program outline concretely their role for development of European cultural identity, communication between the cultures, tolerance and respect to other cultures.
3. *Intercultural education in Bulgaria – ideal and reality*, Association Access, Sofia, 1999
4. Simultaneously the project gave possibility to be practised also the official languages of EU – English, French and German, as well as the neighbour languages (Bulgarian and Turkish), which coincides completely also with the aims of the official policy of European commission in this field – every European citizen to have a good command of not only maternal language but also two languages of the community, incl. the language of the neighbours.

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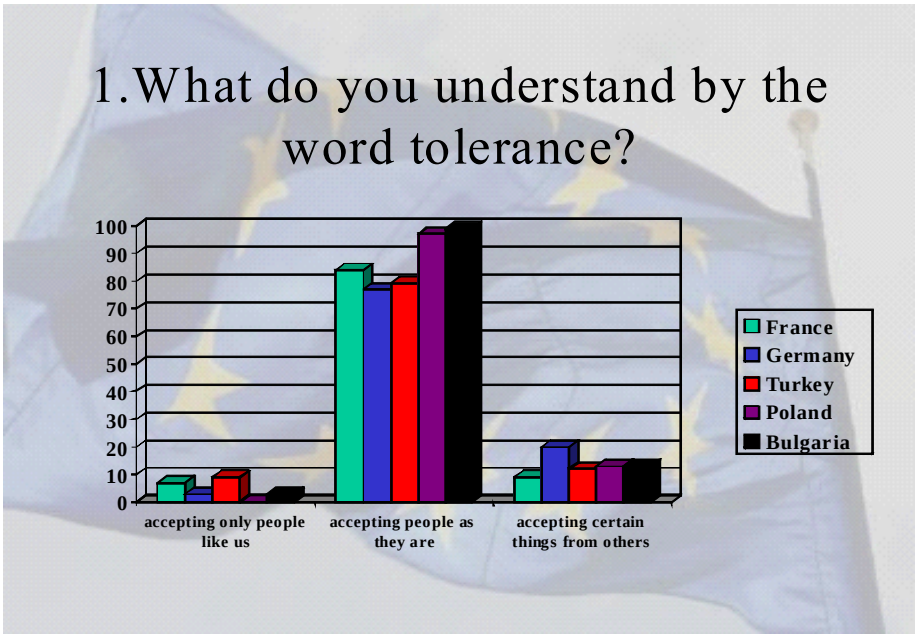
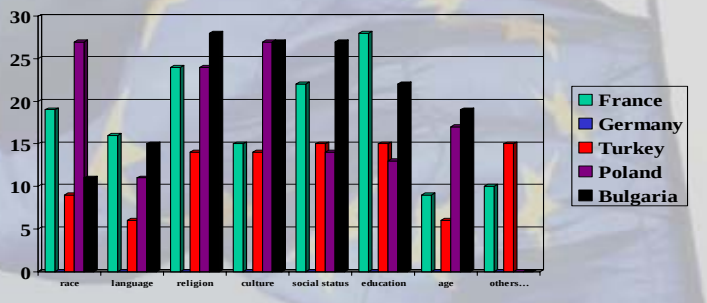
APPENDIX: Students' answers of the questionnaire of the Project "Teaching Tolerance"



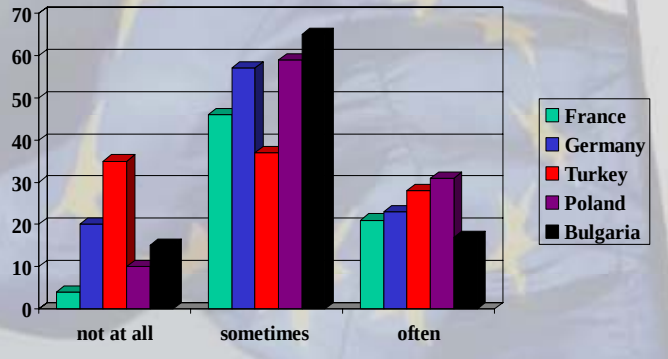
3.Do you think it is possible to have a close friendship with a person of a different religion?

4.Do you think it is possible to have a close friendship with a person of different culture?

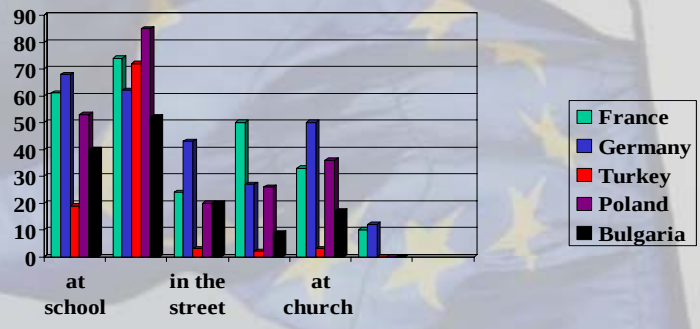
5.What do you consider to be an obstacle to tolerance?



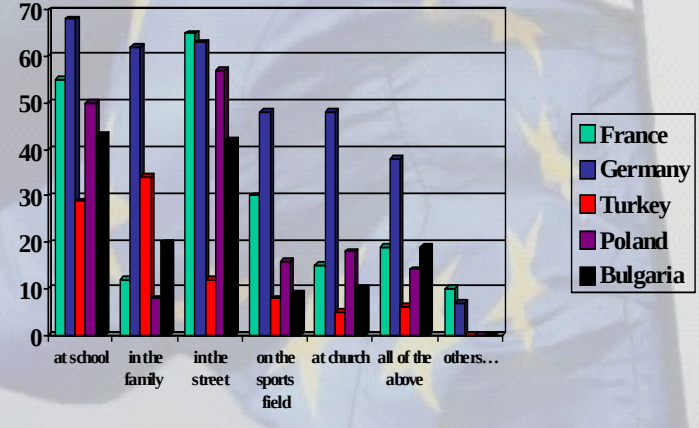
6.Do you believe that religion affects people's tolerance?

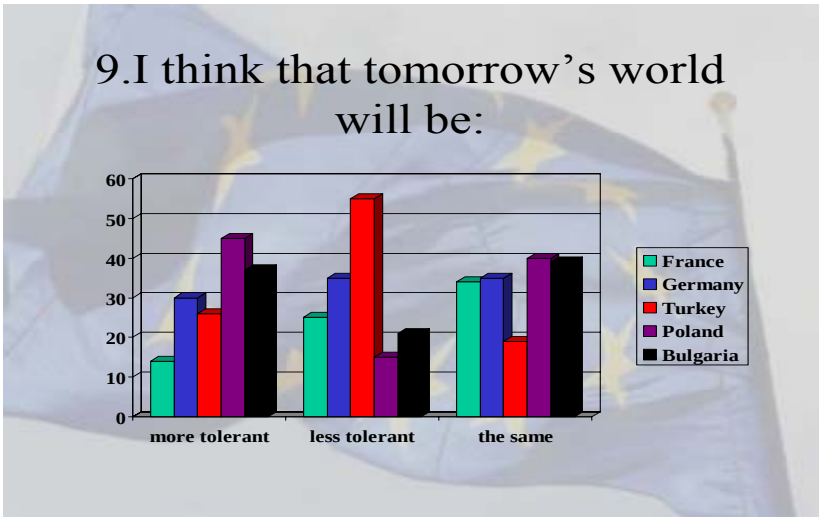


7.Do you believe that tolerance is acquired:



8.Where would you like to see more tolerance?




9.I think that tomorrow's world will be:
60
50
40
30
20
10
0
more tolerant
less tolerant
the same
France
Germany
Turkey
Poland
Bulgaria